Mechanization Will Help the Industry, page 767

COAL AGE

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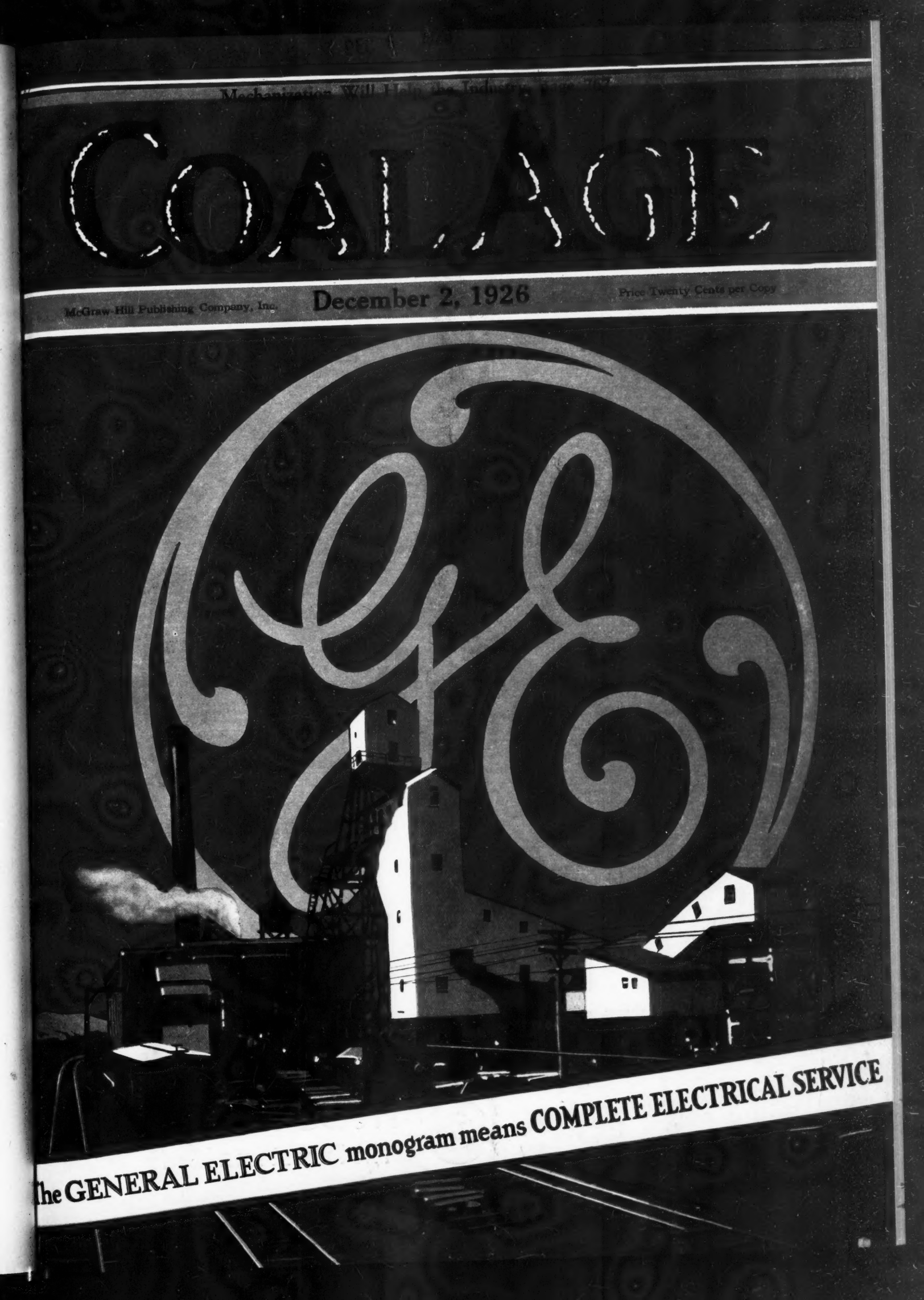

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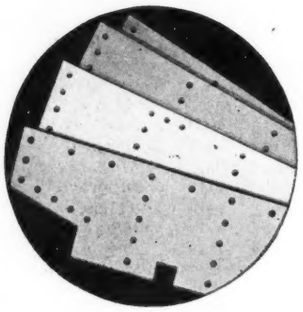

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Devoted to the Operating, Technical and Business Problems of the Coal-Mining Industry

Volume 30 — New York, December 2, 1926 — *Number* 23

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Convention Lessons

These are interesting days to the coal operator. It seems to be the season when meetings and conventions are numerous and important. First there was the great Bituminous Coal Conference in Pittsburgh, attended by scientists from all over the world and which may quite possibly bear results much more important and far reaching than are now apparent. Then, during the first week in December there will be meetings of the American Society of Mechanical Engineers, the Coal Mining Institute of America, the American Mining Congress and lastly the Power Show. All of these are of especial interest to coal producers because they deal either directly with the difficulties of their craft or with the closely allied problems of coal consumption.

The day when the coal men of the land were a distinct group with interests peculiar to themselves and shared by no others, if it ever existed in fact, is now long past. We have reached a state of society and civilization wherein the interests of the coal producer are intimately bound up with those of the rest of the populace. The coal man must of necessity, therefore, interest himself not only with the problems of mining but also with those of the various consumers of his product. He must know not only how to get coal out of the ground at a profit but also how that coal can be burned to the best advantage. To this end some of the more progressive companies have already established "service departments."

In the next and succeeding issues *Coal Age* will endeavor to bring to its readers the more important lessons to be gleaned from the various meetings mentioned. And as we learn we progress.

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COAL AGE

McGRAW-HILL PUBLISHING COMPANY, INC.
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Devoted to the Operating, Technical and Business Problems of the Coal-Mining Industry

R. DAWSON HALL
Engineering Editor

Volume 30 | NEW YORK, DECEMBER 2, 1926 | Number 23

Less Words, More Deeds

A THIRTEEN-YEAR OLD BOY recently won a four year scholarship to college—the prize offered by a Pittsburgh country club for the best composition on what constitutes a good caddy—by taking as his theme "Less Words, More Deeds." This boy probably did not realize that what he considered the primary requisites of a good caddy were also the characteristics, in many of the men for whom he caddied, that made or could make them valuable to their employers. Nor is it likely that he was aware that there is a great need for more action and less talk on problems pertaining to economy and efficiency of plant and business operations throughout the industrial world. Perhaps the greatest single need is for thought and action on the conservation and efficient utilization of the raw materials now available, and on the problem of securing ample supplies of these raw materials for the industrial development of the future. These needs vary from immediate to remote with each industry and, among others, the coal industry can profit from the words of the thirteen-year old caddy.

Progress, Wages and Courage

BUSINESS AND INDUSTRIAL LEADERS are almost unanimous in their opinion that our present industrial prosperity shows no sign of a break. In fact, there are few indications that this country will not enjoy in the coming months even greater prosperity than during the year now drawing to a close.

To a large extent general business and industrial conditions govern the coal industry. But within the industry itself circumstances may be different. Prosperity and progress are not necessarily synonymous. It has been stated that some of the most far-reaching steps toward industrial efficiency have been born of adversity.

That this is true in Illinois can be seen by the progress that mechanical loading has made there. In competition for the same markets when the lower rate of wages of Illinois' competitors are based upon the same tonnage per man per day the odds are in favor of the lower-wage fields. Against such competition Illinois has used a most effective managerial weapon—higher production per man by the increased use of mechanical loading.

Under the adverse conditions that the coal industry has endured in Illinois for the past several years this state has advanced faster and farther in mechanical loading than any other coal-producing region in America. Big things are being done there—and bigger things are being contemplated.

Three men who are prominent in the coal industry of Illinois, Dr. L. E. Young of the Union Collieries Co., whose Kathleen mine is completely mechanized; J. B. Pauley of the J. K. Dering Co., who is equipping an entire mine with a new process which, if successful, will assure the continuity of mining without the annoyance and danger of the present blasting methods, and John L. Lewis, president of the United Mine Workers of America, among those in attendance at the recent meeting of the Illinois Mining Institute spoke of courage and initiative to go forward to bigger and better things in the industry.

Mirroring the Coal Industry

IT IS THE INTENTION and desire of *Coal Age* to accurately present the latest developments in mining methods and preparation processes, and to faithfully reflect the economic conditions, in the coal mining industry. It aims to be a magazine of inspiration and service—one whose weekly arrival is anticipated with interest and with a firm belief that a reading of it will enable the reader the better to meet and solve the problems which confront him. It does not wish to be dull and uninteresting, or to be tossed in the corner or waste-basket unopened and unread. Nor does it intend to confine its appeal to any one class of readers—the material that it presents is, it believes, helpful to all those concerned with getting out the coal.

But, distinct from the "popular" magazines, the readers of *Coal Age* are themselves largely responsible for its "makeup." And, in common with the majority of technical papers, it must have the help and co-operation of all of its readers if it is to fulfill the purpose for which it was created. For it cannot present the new, the original and the unusual in mining methods, processes of preparation and equipment, unless those for whom it is written give it, or help it to obtain, the necessary material. Many of the companies represented by the readers of *Coal Age* are always ready and willing to assist it in any way possible to attain its end. There are, however, many producers who regard any improvements or advances they make as secrets to be carefully guarded and protected from becoming available to the industry in general. This selfish attitude—selfish because it rests on the fear that some other company may financially benefit from the information—is unfortunate, for it retards the advance of the industry.

Coal Age asks its readers to bear in mind that a mirror is effective only in so far as material is presented to it for reflection.

"Little Big Men"

HISTORY RECORDS many instances of "big little men"—men who, though small in stature were big in world affairs. Perhaps the most notable of these was Napoleon, The Little Corporal. But the histories are silent, except where accuracy demands an account of their activities, regarding "little big men"—men who, regardless of their stature and the position to which they have attained, are "small" in principle and in their dealings and relations with others.

Throughout industry a few men of this type in some

manner reach positions entailing more or less responsibility and authority. To those under the supervision of such individuals, and for those in daily contact with them, life is a burden. For they live in a constant state of fear and hatred—fear that their slightest infraction of rules will be severely punished or reported to some one "higher up," and that any meritorious work they may do, or suggestions that they may make, will be claimed by the "little big man." Hatred of this tyrant and of "the job" are the natural result. Under such conditions, it is not surprising to find the efficiency and morale of the organization at a low ebb. Labor turnover accordingly is abnormally high.

Happy, indeed, is the firm or business that is free of this petty despot. However, this fortunate state is not often attained, and if your operation or business does not produce the result of which it is capable (based on the number, nature and efficiency of the equipment and personnel), do not blame the failure entirely on either the machinery or the rank and file. Study and learn the nature, principles and methods of those you have placed in positions of authority, and you may be surprised to find that industrial troubles can be traced to the Simon Legrees of the business and industrial world, the "little big men."

The Tide Always Turns

REPORTS FROM CONSUMERS seem to indicate that certain mines are already lowering the bars which in the last few years have been raised against the loading of dirty coal. This natural result of increased demand is truly unfortunate. The public cannot be made to understand the difficulties of maintaining the same standard of quality when the demand for miners is greater than the supply.

Right now a great opportunity is offered to the industry. Every resource of the operators' associations should be brought into play to counteract this natural tendency to "ease up" on inspection. The problem is of local concern as well as national. When the tide turns those fields which have maintained their standards of quality will have a decided advantage over those which failed to do so.

Records Should Not Be Destroyed

MARKET, LABOR and economic conditions have changed many aspects of coal mining. Today, thin, irregular beds and even former so-called refuse banks are being worked at a profit. New machinery, advanced methods of mining, increased demands for fuel and higher selling prices have made it economically possible to mine and prepare coal once thought unprofitable. Unfortunately, because records of these thin and irregular seams were not carefully preserved, the difficulty in locating and working them has been unduly increased. It's the men in the mine, who must now unlock these treasures, who realize this fact most thoroughly.

Practices similar to those of the past exist today. Some mining companies are unwittingly increasing the difficulties of their future operations by either failing to record the present conditions of various parts of their mines or by misrepresenting them. Of course, for immediate considerations these records have no direct effect on present mining, but there is no telling how soon they will. One common and pernicious practice is that of indicating on mine maps territories which have not been robbed as having been completely mined; another is that of destroying evidence of the location of faults and basins.

Surely, as mining conditions continue to change, when beds at lower levels must be mined and safely supported, the loss of the record of the exact location of pillars, dips and faults will be distressing. Why shouldn't these records be kept, inasmuch as it requires less effort to preserve them than to wipe them out? Much present-day data can never be reëstablished, especially those concerning features of territories surrounded by caves and fills.

Electrical Development in the Mines

SEVERAL YEARS AGO the belief was freely expressed around the mines that it was dangerous to carry alternating current of high potential underground. In a recent address, Mr. Torchio, a vice-president of the New York Edison Co., stated that his firm has long used underground cables carrying 45,000 volts and expects shortly to place in operation a similar conductor that will operate at 132,000 volts. This cable will transmit 120,000 hp. at a voltage twice as high as that carried by any underground conductor now in commercial operation.

No serious trouble has ever been experienced with the cables carrying these tremendous voltages, nor is there any reason to believe that conductors larger than those now in use could not be successfully developed and operated should the need for them arise. From this it would appear that the dangers of taking high voltages underground, like many other misbeliefs of earlier days, are imaginary.

In the same address Mr. Torchio spoke of the many other advances made in electric generation within the past 40 years. Steam turbines have increased in size from 300 hp. to 80,000 hp. and one is now building that will develop 215,000 hp. This latter machine will deliver more than 1,700 times as much power, and will produce four times as much electrical energy per pound of coal, as did the first generating unit installed only about four decades ago. Among other economy-producing and consumer-service improvements that have been made should be mentioned the adoption of water-cooled fireboxes and pulverized coal burners, the installation of huge storage batteries and the maintenance of enormous reserve capacity to insure continuity of service.

The economies and examples of service introduced by the electrical industry are worthy of emulation by others. It is not unreasonable to assume that the coal industry could greatly benefit itself by effecting greater economies in operation and marketing, and by offering a more extended and improved service to the consumer.

Think—Plan

AT $5 PER DAY, a man, working 200 days in a year, represents the interest at 6 per cent on an investment of $16,666.66. If you spend $1,000 to make the work of three men easy enough to be done by two men so that one man is released for other productive work you get the $1,000 back in 200 working days and you save $5 per day from then on. Sometimes $100 will do the trick.

Mechanization Will Help the Coal Industry

Why Not Encourage Its Development by Scientifically Determined Wage Rates?—Earnings Based on Performance Fair to Miners and Management—Can Scientific Management Help the Coal Industry?

By Jerome C. White
Assistant Editor, *Coal Age*, New York City

ANY LABOR-SAVING APPLIANCE, to justify its introduction into industry, must benefit three parties: The employee, the owner, and the public. To the employee it owes the duty of increasing his earning power; to the owner that of maintaining or conserving his profits and increasing his chances of staying in business in the face of increased competition either from within his own industry or from competitive industries; to the public it must give a cheaper product.

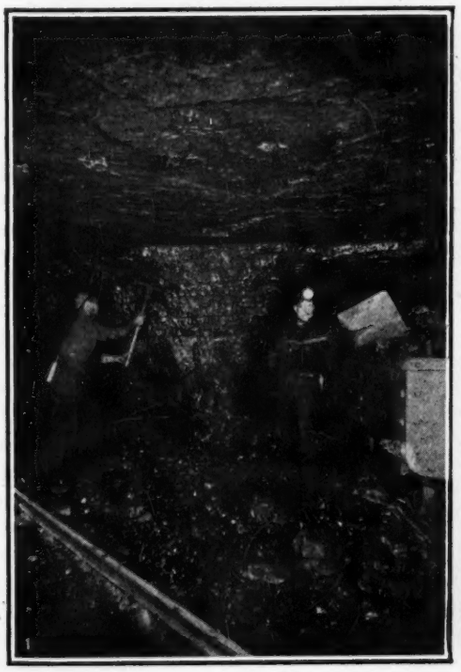
The task-plus-bonus method of wage payment is simple enough to be clearly understood by those it is designed to benefit; it is fair, as the basis upon which it is determined may be decided jointly; it offers increased earnings as a reward for individual or group effort. The proposed method is simple and economical to operate, provides a real incentive to labor for higher earnings in return for increased production and to management decreased costs and better control.

The idea back of the task-plus-bonus method is that an equitable arrangement be made between management and employees. If the task is accomplished the company will receive a definitely known minimum output at a cost which will pay for the machine's operation. In return for the employee's or crew's effort to exceed the minimum which has been set they not only receive a reward which is large enough to make them wish to accomplish this amount of work but they also are guaranteed the hourly rate if they fail to reach the task. Thus the workmen have all the advantages of the day rate on a task they do not meet and all the advantages of tonnage rates if they succeed. Under this method of wage payment the management must have sufficient control of operations to insure that proper conditions for maximum output can always be maintained. I refer, however, only to such conditions as are within its control.

In many instances a machine may, of itself, possess economic possibilities, yet by reason of the conditions under which it is compelled to operate lose all of its advantages. When the day rate of wage payment is used, the public and owner may get some benefit through increased production and lower costs, yet the fullest advantages cannot be realized. The objection to the ordinary day-rate plan is that labor gets no share of the benefit, or at least not an adequate share, and it then proceeds to demand a high rate, based upon the machine's possibilities, rather than upon performance. Such a rate penalizes labor-saving machinery and acts as a deterrent to mechanical development. This is particularly true of mechanical loading in mines.

Labor and Management Share Profits

The argument for the ordinary day-labor rate is usually that labor has had no share in the development of mechanical appliances and has contributed nothing which would entitle it to any share above its daily wage. This method of reasoning I hope to prove false. Ordinarily, a day rate of $7.50 or whatever it may be, belongs to this class of labor, yet pressure may be brought to bear upon the owner until the rate becomes abnormal. It is abnormal if it is out of proportion to the wage received by other labor; it is then unfair because it is limited to a small number; it is not an equitable rate for it is not based upon a definite performance. The objection here is not to aggregate earnings in dollars and cents, but to the method of



Brawn vs. Brain—What Price?

In return for relieving a man of strenuous physical labor the industry is going to ask him to drive a machine to its capacity. For using his brains to direct a power vastly greater than that of his own puny muscles he will receive the same wages and more. However, the rate for the output of the machine must not be upon the same unit basis as that received for hand labor.

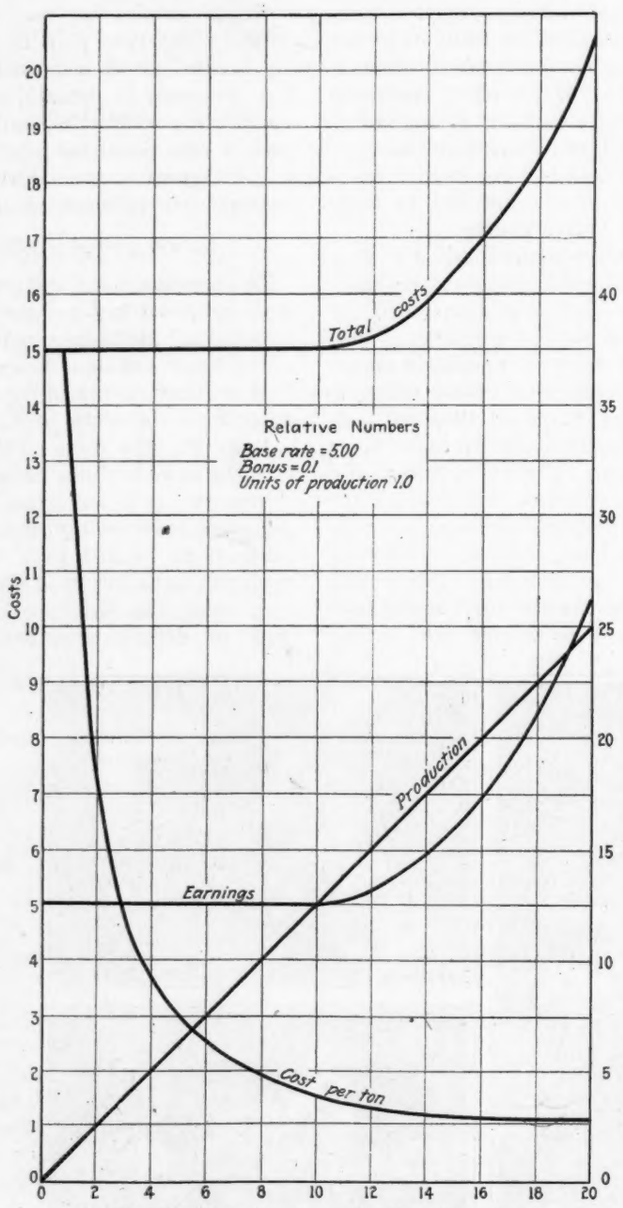
INDUSTRIAL success depends as much upon methods of management as upon mechanical means and operating systems. The nearer a coal mine approaches complete mechanization the better it can then use the scientific-management principle of centralization, to plan, schedule, and dispatch in controlling production, costs and quality. As one observes the orderly development of the steel and automotive industries, he sees that their methods apply equally well in the coal industry. Science is applied in engineering—why not science in management, that is, scientific management?

determining such a rate. It is objected to principally because of the fact that the rate was just "set" and not determined according to any definite standard of equivalent return for performance.

Under the day-rate plan, whatever the scale and whatever the supervision, men are not alike in personal qualities and there is no incentive for employee initiative. After a time a certain tonnage or performance may become an informal standard, determined more by surrounding conditions or customs than by machine capacity. This may be the fault of either management or labor but sometimes both. In any event, there is no penalty for sub-standard performance just as there is no incentive for the able man to exceed the standard. There is no human reason why he should strive to do more than the poorer man if he can receive no more. I am not inferring "soldiering." I am speaking of the average performance by fair-minded men that approximates a fair day's work for a fair day's pay. In these times of strained economic conditions those who are to survive must accomplish better results than are being attained at present.

The coal industry will be forced to use more labor-saving machinery, not only to install it but to use it to its ultimate capacity and efficiency. It is not going to be a case of driving men but of inducing men to drive machines. In turn, for relieving these men of strenuous physical labor it will be necessary to induce them to drive the machines to their utmost capacity. This will be requisite for their own welfare if their employers are to stay in the business as it has been already noticed that the third party, the public, is relentless. Mere expenditure of more muscle power will not solve this problem. It will be attained only by intelligent co-ordination with the proper reward of effort.

In advocating the day wage it has been stated that the loading-machine operator should be paid by the day for the main reason that loading machines will force mine operators to assume more responsibility for what goes on at the face; management must take over the work for which it is better fitted than the workman. It is the duty of the management to plan and that of the workers to perform.



As the Earnings Increase the Cost Decreases

The bonus rate increases by 0.1 for each unit increase in production above the standard. The incentive is present to reach for the next higher unit of production because the rate is higher, paying the maximum bonus when the maximum production is attained. In the chart the base wage rate of 5.0 plus an overhead charge of 10.0 is used in calculating the total cost.

Under the day-rate plan conditions under which a machine will work may be good, bad, or indifferent; the production may be in proportion to conditions. With poor conditions, under which the tonnage will be low, no plan of payment other than the day rate would be fair to the employees. They could not make a living under tonnage rates, unless those rates were abnormally high. A schedule made abnormally high because of poor conditions, would be inequitable should conditions be bettered and a larger tonnage made possible. However, there would probably be trouble were any attempt made to adjust rates to the improved conditions. This is the point that makes necessary an accurate study of conditions, standardizing those which are within control of the management, before making or setting any rates. To be fair and equitable all rates must be accurately determined and based upon existing conditions. Those that fit one mine may not fit another.

Tonnage rates for machines are not usually demanded where operat-

Why Not a Scientific Rate?

Each of these machines has operating characteristics of its own. Why burden a machine with a rate that is not suited to it? The over-all efficiency of an operation is the sum of the efficiencies of labor, management and the machine.

In the correct determination of a task-plus-bonus method each of these factors would have to be taken into consideration and the result scientifically, rather than arbitrarily determined. Why not try to encourage mechanization?

ing conditions are bad and earning power is low. Such a rate where conditions are good, and higher earnings possible is not the fairest solution of the problem. One reason for this lies in the fact that the employees are not responsible for the conditions under which higher earnings are possible. Planning, good maintenance of power and equipment, good roadbeds, and concentration of working places, are factors that always contribute to the high production of machines. They all lie within the control of the mine operator. Yet, when these conditions are present, they contribute to the workers' earning power on a tonnage rate. If because of a breakdown or failure to function of any of these factors he cannot produce during his entire shift it is usual for him to look for company time to make up the loss.

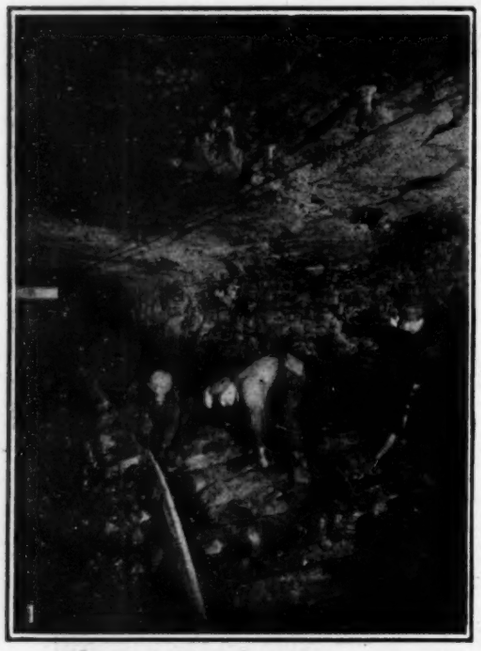
The differential existing under the tonnage rate is seldom fair. Return on the investment must be looked for in a reduction of general costs arising from increased production, rather than in direct earnings of the machine. It is possible that by having a number of machines, which would tend to run the average tonnage per man higher than pick mining, this higher over-all output would be the factor responsible for a decrease in production costs. This would be indirectly due to machine operation, rather than to the efficient performance of each individual unit. It is to the efficient performance of the individual machine, however, that attention must be paid.

Task-plus-bonus payment for machine work, if accurately determined and based upon existing conditions, will provide for the employee larger earnings based upon performance, that are earnings in proportion to the effort put forth. Such a method will reward the efficient worker under ideal conditions; it will furnish him the prevailing wage in case of unforeseen breakdowns for which he is not responsible and which are beyond his control; it will give him the necessary incentive to produce because he will share in the increase of his production. It pays and rewards according to performance. It assures the owner an adequate income that will enable him to continue in business. It will help management secure maximum prosperity for the employer while simultaneously assuring maximum prosperity for each employee.

A task-plus-bonus is an incentive method in that the employee is rewarded in proportion to the effort he puts forth and the degree of skill or efficiency with which he does his work. This method has many modifications and is subject to a wide range of variation to suit varied conditions. A standard is set at a certain number of units produced. This standard of performance should be accurately determined and based upon existing conditions. It should be used as the minimum production per eight-hour shift in return for a base rate. After this standard has been attained there would then be a rising scale of production units with a correspondingly increasing efficiency reward. These above-standard production requirements and premium payments must be possible of attainment within the available time by maximum efficiency. The minimum standard, or that production to be attained before bonus payments begin, should represent a fair performance, and can only be set after a careful investigation. The most accurate and thorough method of determining these standards is by time study.

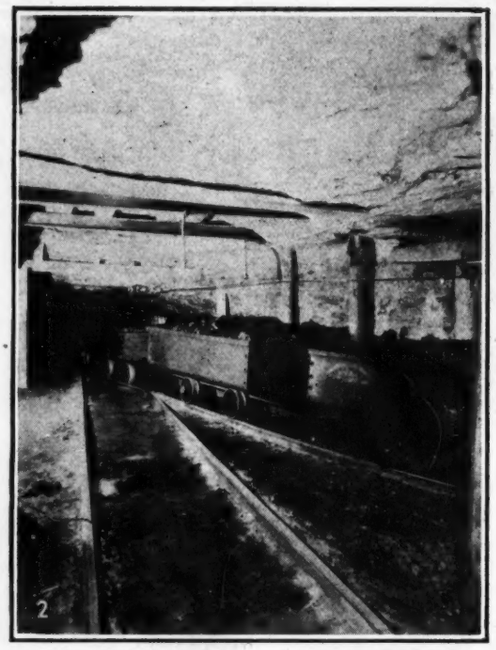
The standard set as a minimum will be that which will repay the management for its investment and the expense of maintaining excellent conditions under which high earnings are possible. Any production beyond the minimum which will net a fair return is profit. Any increase in production which makes this profit possible, and which results directly from the interest and efficiency of the individual workman will be shared with him, because he will have earned it by his skill and efficiency. After he attains a standard that has been equitably established he is rightfully entitled to a share in the profits that he has helped to make. Where several workmen are concerned, as in the case of loading machines, this is taken care of by group- or gang-bonus methods.

"The day-wage system is contrary to the underlying principle of efficiency reward and to all principles of equity, since it lacks any intelligent relation between past performance. Compensation for work cannot re-



What Is to Be Management's Reward?

Upon the maintenance of good track over which to dispatch and speedily move loads from and deliver empties to loading machines depends the earnings of the machine crew. The better the management, the greater the output, and consequently the greater the employees' opportunities for increased earnings. Why should management not share in the increase it has made possible?



Why Limit the Loading Machine by Car Supply?

Upon the initiative and efficiency of the gathering crew assigned to the loading machine much of its efficiency depends. If desired they may be made a part of the loader crew by task-plus-bonus payments using the group or gang method, thus receiving a reward for using their heads to keep the machine in cars.

main an exception to the general law that there must be a definite equivalent, based upon the two elements of quantity and quality, and our ability to measure accurately both quantity and quality, is one of the measures of civilization," says Harrington Emerson. The day wage, in general, as a method of payment, is suffered to remain in the absence of a fair means of measuring what constitutes a day's work, or a definite performance. With machine production this is not equitable because measurements can be made fairly and accurately, and rewards can be established accordingly.

Straight tonnage rates are determined without respect to conditions. They have to be supplemented by allowances for lost production by the employee for causes of delays beyond his control. Where there is no such allowance the machine operative is penalized for conditions for which he is not responsible. Where machine mining is on a straight tonnage rate there is no particular incentive for management to put forth any extra effort to eliminate possible delays. With the premium method an incentive is furnished to the machine operator to reach a high standard and to the management to maintain this standard and to eliminate all possible delays because they mean a loss in production, the magnitude of which is possible of measurement and can be made a matter of record. Better co-operation is created and maintained between management and the worker, because each has a known and definite responsibility, with rewards for efficient accomplishment.

WAGES GUARANTEED

A task-plus-bonus plan guarantees payment irrespective of production; it does not penalize the worker for loss of output arising from causes beyond his control. It makes possible higher earnings or those in proportion to the skill he possesses and to the effort he puts forth. He receives as a base pay the current scale of wages for the type of work performed in return for a certain standard of production. Anything that he attains in excess of this he shares with his employer. This fosters co-operation between labor and management.

When the production drops below that set as a standard both parties lose. It is evident that if the machine operator is guaranteed a regular hourly rate and his production falls any number of units below this standard, the cost per unit will be increased. If this lessened production results from negligence, wilful or otherwise, on the part of the employee he is penalized therefor by losing the opportunity to earn a premium; if it is due to a cause within the control of management the employer is penalized in that he must bear the higher unit cost, and is deprived of the profits that would accrue with a high production. In either event such causes of lost earnings will not be allowed to remain. In the working of a premium system operation reports are required. These will be accurate and will constantly locate and show up the weak spots. Labor will, therefore, be interested in management and management in labor because their interests are mutual.

Inasmuch as local conditions vary widely no definite rules for the inauguration of such a plan, other than a general idea of its operation, can be given; what would suit one operation might be a total misfit in another. The general scheme is a standard production in a definite time in consideration of a certain wage. Beyond this standard, which must be physically possible of attainment, would be a graduated scale of reward for performance. As an illustration: If 10 units per 8-hr. shift are to be produced as a standard, the eleventh unit would increase the workman's remuneration by 0.1 and similar increases would be made for each succeeding unit of production above the minimum. The figures used in the accompanying chart are relative numbers only. They are not based upon any wage scale, but are used to show the relationship existing between production, earnings and costs. They are here presented as illustrations only. They must not be considered as any essential part of the plan; the detail must not be mistaken for the principle.

INCENTIVE METHODS HELP PRODUCTION

The correct figures and correct rates will reveal themselves during the progress of the time study and in the investigation of the problem. In addition, many other interesting facts will appear, the existence of which have never been suspected. Inasmuch as this is not an article on time study, however, this phase of the question will have to be passed over.

Under the task-plus-bonus method the workmen receive a minimum wage whether the work has been planned for them or not. This "puts it squarely up to" the management to see that the track is laid and other services performed which are strictly management duties so that the total possible benefit may accrue from the time of each crew.

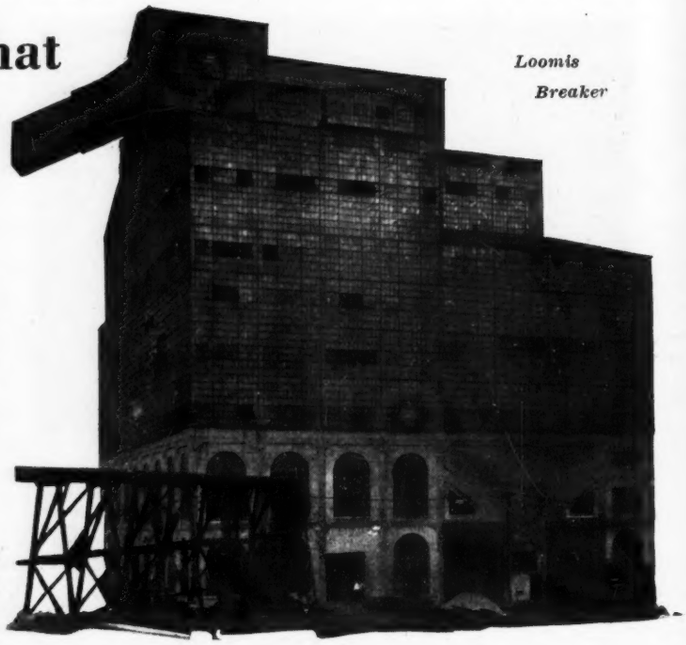
When day wages prevail production is "pushed," maximum output being the result of exact planning and close supervision with the entire burden upon management. With straight tonnage rates, production is "pulled," and loss of output represents not only a loss to the employee in earnings, but also to the management, in increased overhead. But with the task-plus-bonus system production is both "pushed and pulled," both parties, management, and labor, sharing responsibilities and proportionate rewards for the maintenance of good conditions or those conducive to maximum production and efficiency.

WHAT IS SAID TO BE the largest ventilating fan in the world was recently built for a South African coal mine. The fan delivers 700,000 cu.ft. of air per minute, and is driven by a 650-hp. motor.

Launders with Traps That Remove Slate and Bone Clean Coal at Loomis With Minimum Loss

Uses Three Time-Honored Principles of Separation and Extracts Refuse Without Disturbing Stratification—Reject Virtually Free from Coal and Coal End from Slate

By R. Dawson Hall
Engineering Editor, *Coal Age*



Loomis Breaker

CONSTRUCTED on the simple principle that substances of different specific gravities when run through a long trough, or launder, will stratify or separate into various layers, the Rheolaveur, as installed at the Loomis breaker, of the Glen Alden Coal Co., near Nanticoke, Pa., is producing results of unusual excellence and uniformity with minimum attendance costs.

The washer is provided with patented means by which the heavy undesirable material can be removed on its journey without destroying the stratification. Other equipment is provided by which the mid-product, that is middlings or bone, can be returned to the launder to form an impassable barrier between the good and worthless material so as to make it possible to withdraw the slate and undesirable bone without removing coal with it. It is interesting to note that the coal below 3½ in. is washed at the Loomis breaker without preliminary sizing, the shakers being arranged to size only the washed coal.

In rapidly moving bodies of water, such as those used at the Loomis breaker, the stratification results from various actions, first and most important among which is gravity. The coal does not sink as rapidly as the bone nor the bone as fast as the slate, so the three are naturally to be found endeavoring to settle but being carried along in the stream flow with the coal on top, the bone below it and the slate on the bottom with relatively clear water on the top.

This action may be, and sometimes is, heightened by the fact that the launder, like a plain chute without water, tends to separate coal and slate by friction resistance as well as by gravity. The slate may be flat and if it is, it exposes a broad surface to the bottom of the launder or to the other slabs of slate adjacent to it. The coal is likely to be round or blocky and top heavy and so is disposed to roll down the incline.

These respective qualities of coal and slate have been used repeatedly to facilitate their separation, and they have proved in some instances of considerable value. Occasionally it has been found that the slate is almost as blocky as the coal. In that case the frictional resistance of coal and slate would be more nearly equal and the difference would not materially aid in the separation. Unless the coal is slabby and the rock blocky, which is unlikely, the frictional resistance will either aid in the separation or will not retard it. It is likely to be a factor either larger or smaller in the cleaning of the coal by this method.

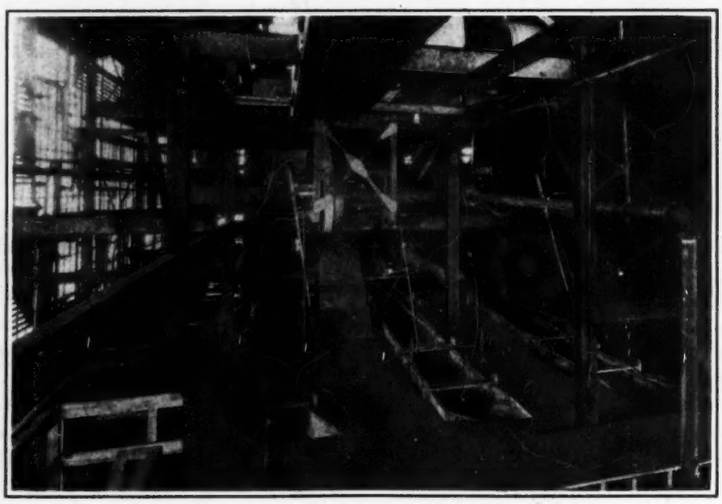


Fig. 1—Main and Rewash Launders at Loomis Breaker

The two troughs on the left in center of the illustration are the main launders for the washing of the run-of-mine coal; the trough on the right washes what little coal and good bone remains in the refuse. As a result of the rewashing the quantity of coal left in the reject is negligible.

But there is a third and related principle that aids the launder. The coal being frequently, as stated, round or blocky, presents a larger face to the flowing current than the slate which is slabby. It has, therefore, a tendency to travel faster than the slate and hence to rise in the water. The value this tendency may have with coal and slate in general is variable, but it is certainly better to have the force of the water aid in the support of the round coal than to have it aid in the support of the slabby slate as it does when the washing is done by an upwardly moving current.

Principles like these are all very well, however, but unless some means is found for removing the undesirable material without spoiling the stratification, nature only confounds itself. If riffles are put in the trough,

as has been done in times past when coal was washed by the same principle, they soon fill up, and if they are made deep enough to hold any quantity of material—and that is essential—their action varies according to the quantity of material behind them.

At first when nothing has collected behind the riffle, only the lightest material is raised sufficiently to pass over it. Later when the space above the riffle has filled, everything has to go over it, even the slate, so it is a heterogenous material, mostly of low-grade but also partly of high-grade, that backs up against the riffle, and much low-grade material travels down the launder, some of which for a while collects behind other riffles further down the line. Later all the slate passes over with the coal and then the spaces behind the riffles have to be cleaned.

Some designers have made arrangements by which the riffles may be raised, the coal being at the same time switched to another trough. The water then sweeps away the refuse material which is diverted by a gate from following the course of the washed coal. But when the riffles are filling, the good material, as has been already stated, is in part trapped with the bad. So unsuccessful is this system that it long ago ceased to be used, at least in the United States.

And yet, the stratification principle of the launder was sound. All that was necessary was to remove the undesirable material continuously without destroying the stratification. This is done at the Loomis breaker by Rheoboxes, or traps, which are placed in the bottoms of the trough. These traps in the part of the washer now being operated are known as "sealed" boxes, because the refuse trapped by them falls into the boot of an elevator which is kept at all times full of water to a height equal to that in the launder at that point. The water, therefore, which is introduced into the box by piping, tends to rise and retard the escape of refuse and coal rather than to assist it.

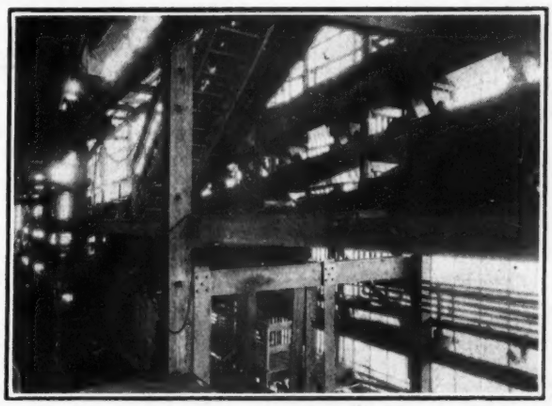


Fig. 2—Free-Discharge Launder for Fine Coal

This can be seen with its boxes near the top of illustration and on the right. Below is the trough in which the discharged refuse is transported. At the bottom of the illustration can be seen the Parish shaker arms from which the screens are hung. These latter cannot be seen.

Here an interesting fact should be recited. When a bed of slate or shale in a launder filled with flowing water contains interstices that have not been filled, it tends to entrap in those small open spaces small pieces of rock or bone. Fine particles of these inferior materials are not as numerous as fine pieces of coal, for the coal is more fragile and has been shattered in shooting. So some coal particles tend to be found in the traveling bed near the bottom of the launder. The "hydraulic water"—to use the term that is current for the water introduced into the box—passing up, catches these fine particles and releases them but not to such a degree that they cannot be found in the discharge of the first and second boxes.

Before describing these traps at greater length, it is necessary to call attention to a detail in the construction the value of which at first sight seems difficult of comprehension. The operator of the Rheolaveur talks of "building a bed" by which he means attaining a depth of product in the launder a large part of which is a bone ranging around the specific gravity sought. Such a screen of middle-class material serves as a barrier between the upper- and lower-class products and prevents the small particles of fine upper-class material, or clean coal, from drifting down and being trapped with the lower-class product, the slate and dirty bone.

So, instead of deliberately trying in the second Rheobox to make a discriminating selection and to trap nothing out of the launder that is salable, the operator of the washer with a lavish hand removes a lot of salable bone and even some fine coal and elevates it to such a height that he can add it to the feed. Thus the bed is built up with off-color material that screens the better coal from that which is inferior.

With these words as to the principle of the washer duly set forth, it is convenient to proceed to a description of the washer itself. The Loomis is a large 6,000-ton-a-day breaker, built in 1915. At the time of its erection it was the last word in breaker construction, not only in being constructed of steel, concrete and glass, but because it had the machinery best calculated at that time to produce the coal in the best condition for the market with the minimum of cost.

Time is making changes in this respect as in others. Since the erection of the breaker the dry preparation which was first installed has been changed to wet, and it was decided later to make a further change and convert one-half of the breaker in accordance with the Rheolaveur system, leaving the rest temporarily to operate as before, the breaker being a double one with the right half a practical duplication of the left.

The coal comes to the breaker from six separate sources, one of these being the Auchincloss mine from which coal is hauled by steam locomotive. The other sources are closely grouped around the surface plant. As much as 7,600 tons has been handled in a single day, though the breaker is regularly called on to clean only about 5,600 tons of coal daily.

The coal is normally above the average in quality and in freedom from bone and slate. In fact, in designing the Rheolaveur, it was realized that with so clean a coal adequate provisions should be made to maintain a sufficient bed of middlings to prevent coal from passing to the refuse and some refuse from finding its way with the clean product.

As the coal is coming from so many sources the feed is fairly regular and can be made almost entirely so by a small degree of storage. In the flow sheet the coal is shown arriving as run of mine at *A*. It passes to the main shaker *B* where coal over 3½ in. is removed and taken to tables where the rock is picked and slate is split by hand from the bone and sent to the dump.

The coal that passes through the main shaker is taken to a feed pocket with two hoppers *D* where two mechanical feeders *E* of continuous type pass coal in a steady stream into the head of two long inclined launders *F*, 32 in. wide, which merely divide between them the work to be accomplished. Both operate all the time and have

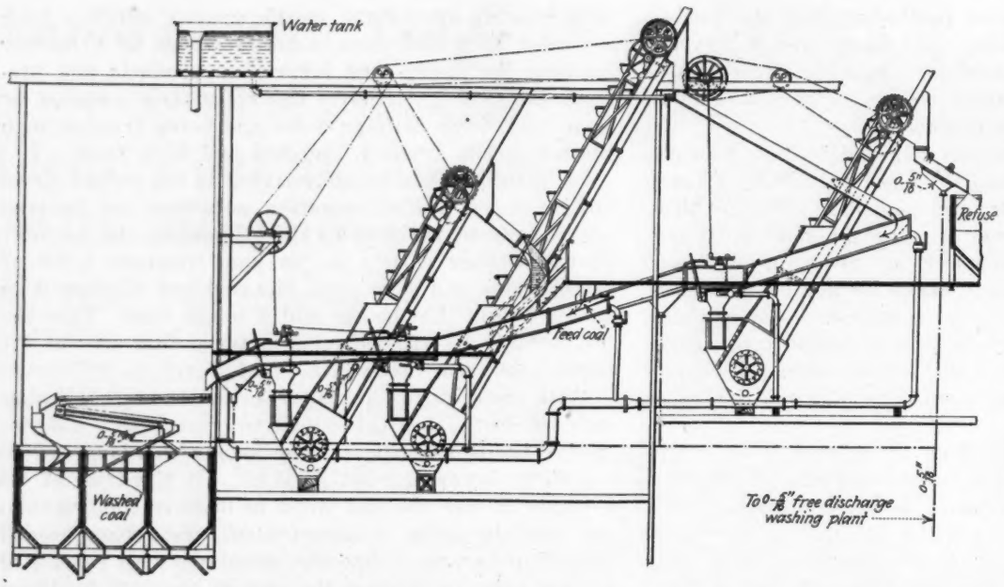


FIG. 3
Launders and Elevators

This diagram illustrates the system. Coal is first introduced where the words "feed coal" appear. It stratifies on its way to the first box where the worst refuse is removed. At the next box middlings are extracted and fed back into launder. The refuse from the first box goes back to the head trough and there, what little middlings and coal may be in it pass back to the main launder to join the feed. At the end of the main launder clean coal passes to the screens.

their boxes, *G* and *H*, feeding to the elevators *I* and *J* respectively.

From 85 to 90 per cent of the coal fed to these launders at the Loomis plant is clean and consequently goes out at the end of the trough where it is carried to the shakers, screened and dropped into the track pockets ready for loading.

Where the feed consists—as in the anthracite regions to the south—of a large percentage of rock, more refuse will have to be withdrawn in these primary launders.

The material taken out of the second boxes *H* is lifted to such a height that it can be restored to the launders *F* at the same point as the feed *E*. The contents of the box *G* falls into the boot of the elevator *I* and goes to two 20-in. launders *J* which are upward extensions of the washing launders *F*. Fixed screens, *K*, are interposed on the way to remove dirt under ½ in. allowing a portion of it to pass back to the head of the launders

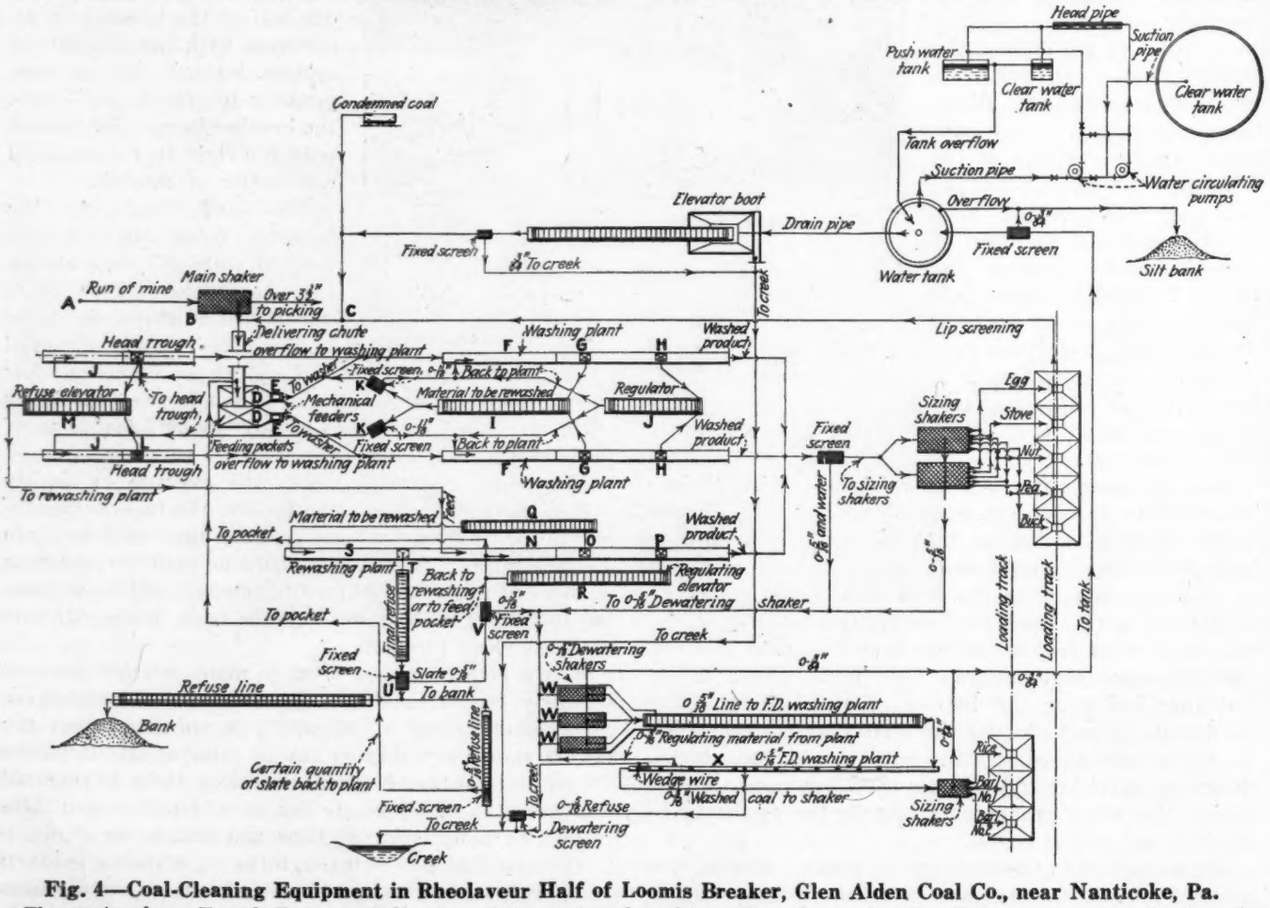


Fig. 4—Coal-Cleaning Equipment in Rheolaveur Half of Loomis Breaker, Glen Alden Coal Co., near Nanticoke, Pa.

The parts above *V* and *U* are sealed-discharge washers for the cleaning of unsized coal up to 3½-in. diameter. The lower part on the right has relation to the free-discharge washer *X* which at present has not been kept working as the fine coal is so clean it does not need washing. The refuse in the sealed-discharge boxes falls into static water, the back pressure of which is equal to the head in the launder above the box. In the free-discharge boxes the refuse and water fall together, but in this case also the discharge is not quite free, for here the opening is so small that the water introduced into the box tends to well up into the launder. In the actual installation the rewash trough is on the opposite side of the main launders from that here shown.

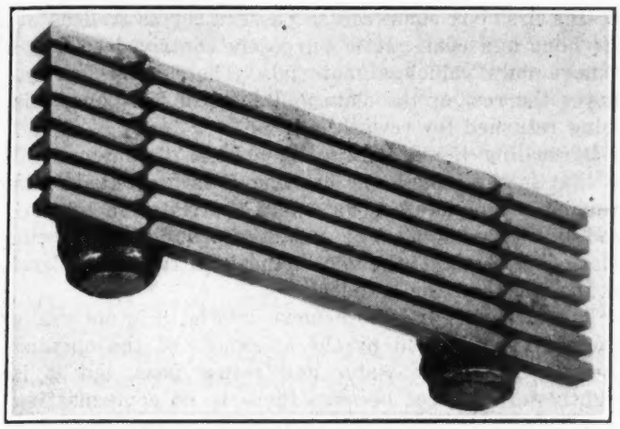


Fig. 5—Screen of Wedge-Shaped Bars

The opening is small on top and large below making for rapid clearance of material, greater stiffness and ability to minimize by the thickness and width of the bars the ill effects of corrosion. Fine screens are usually of thin metal and corrode rapidly.

F with the idea of building up the bed with heavy rock particles of this range of size.

The material reaching launders *J* is rewashed in those troughs, the refuse being removed in the boxes *L* and elevated by a bucket conveyor *M* whence it is taken to the rewash plant. The material that passes over box *L* is clean coal and goes to the head of launders *F* where it mixes with the original feed.

The rewash plant consists of a 20-in. launder with two boxes *O* and *P* and two bucket elevators *Q* and *R* which carry the refuse back to an extension of the trough *S* where it is again washed, the worthless material being removed by the final box *T*. This contains practically no free coal but some coaly material that has enough pyrite or slate or both to make the product very heavy. The pyritiferous coal might possibly serve as fuel but that which is heavy because it is mixed with slate would be unsuited to that purpose. At present this goes to the dump, but at some future time it will probably be crushed, setting free the coal which can then be separated by rewashing.

The waste before being taken to the refuse line and rock bank passes over a fixed screen *V* where material between 0 and $\frac{1}{16}$ in. is removed. Part of this material between 0 and $\frac{3}{16}$ in. is removed on the fixed screen *V*, the rest being sent back to the rewash *O* to build up the middle product with material between $\frac{1}{16}$ and $\frac{1}{8}$ in., thus filling the interstices in the coarser material of the launder *O* and preventing the fine coal from falling into them. The material in launder *S* that is not trapped in the box *T* continues its travel through launder *N* and if not trapped in boxes *O* and *P* flows out of the end of the launder and joins the coal from launders *F* and *G*.

To dewater the coal it is passed over a wedge-wire screen made at Warrington, England. The wires of this screen have a wedge shape so that the openings at the underside of the screen are quite large and those at the top are quite small. These upper openings vary in fact with different screens from 0.5 to 12 mm. (0.02 to 0.468 in.). The specially light sections are made with wire which at the top of the screen has a width of 0.0625 in., the depth being $\frac{1}{8}$ in. The wire is therefore twice as deep as it is wide. There are several weights of wire, but the heavy sections are built up of wires $\frac{1}{4}$ in. wide and 0.2187 in. deep. Extra heavy sections are made for the coarse screens. The wire is wound at intervals by special machinery round a bar of circular cross section the distance between bars being about $2\frac{3}{4}$ in.

This type of screen is so heavy that it is not readily destroyed by corrosion. It is so stiff that it does not sag and hold back material. Consequently the whole area except over the bars or rivets is available for screening. The dewatering screens at the Loomis breaker have $\frac{1}{16}$-in. openings. It will be seen that, should the screen corrode so as to enlarge the openings, it would still remain so strong and serviceable that it could be used at some other place where larger openings are desirable. The better way, however, is to prevent corrosion by the use of neutralized water. At the Loomis breaker the water comes from the river.

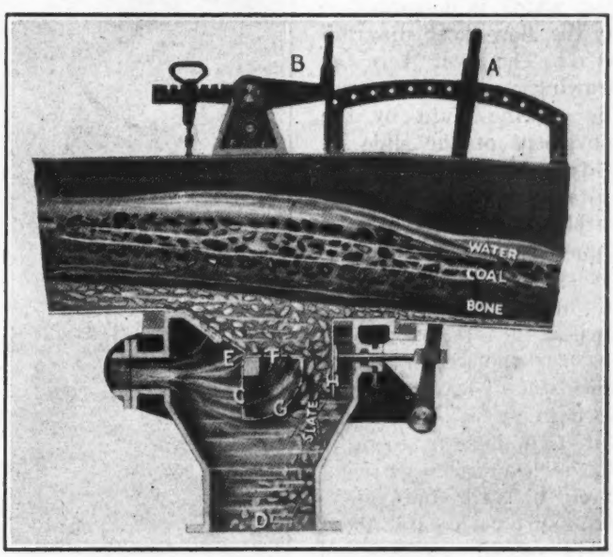


Fig. 6—First Sealed Refuse Trap

A is the lever, regulating gate *H*. *B* is the rocker arm which opens and closes the rocking gate *CGF* which has perforations on all three surfaces. *E* is a screen. Water enters on the left, and refuse escapes at *D*.

The coal after being dewatered passes to the sizing shakers and thence to the pockets for the respective sizes. At present more coal is passing through the washer than the shakers can conveniently handle, and some of it accordingly is being condemned for imperfect sizing. This, of course, is a detail that readily can be corrected.

Provisions have been made for further washing of the fine sizes in the "free-discharge" washers, but the coal is so clean that it has not been found necessary to give it this further treatment. If in the future the refuse from the "sealed-discharge" washers already de-

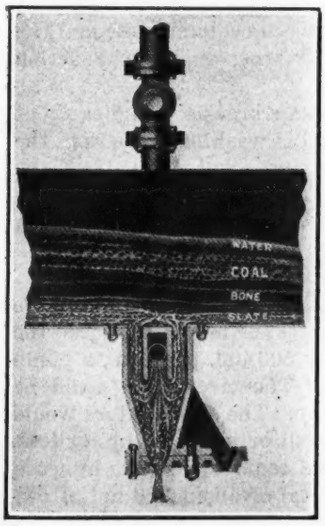


FIG. 7

Free-Discharge Box

This illustration shows the stratification at the first box in which slate alone is removed. A stream of water from a pipe is directed toward the orifice which being throttled causes part of the water to rise and enter the launder. The size of the orifice can be regulated.

scribed is crushed it will be necessary to utilize this "free-discharge" washer. In this event all the coal under ⅜ in. will be taken to dewatering shakers *W*, where 0 to ⅜ in. material will be removed to the water tank. The ⅜ to ⅝-in. coal will then be elevated to the head of the launder, passed over this trough with its several "free-discharge boxes," dewatered on a wedge-wire screen and delivered to sizing shakers *Y*. The 0-⅜ in. will be passed over a fixed screen dewatered and washed by the overflow to the silt bank. The coarse material will be sized into buckwheat No. 1, rice and barley Nos. 1 and 2 and delivered to their respective pockets.

The launders are extremely simple. They are built of wood but lined with heavy No. 10 gage steel plates that will long resist corrosion, especially seeing that fresh river water alone is used.

An illustration shows the first sealed discharge box, which is denominated in the flow-sheet diagram as *G*. The lever *A* in the drawing regulates the opening on the right by the movement of the slide *H*. This lever can be set in a suitable position and will rarely, if ever, have to be changed. An oscillating lever *B* can be seen on the upward side of box with a rack on the left arm providing for the regulation of the point of attachment of a chain by which the flap gate *CGF* is actuated

The lever makes a complete upward and downward movement about every second, opening and closing the gate in an equal period of time. There is a tendency of the material escaping through the opening to bridge the gap, and this is prevented by providing for a temporary enlargement of the opening. Because the exit for the slate is made alternately large and small, it cannot stop up nor will it permit sufficient material to escape to destroy the stratification. The main control of the quantity of material entrapped is by the lever *A*.

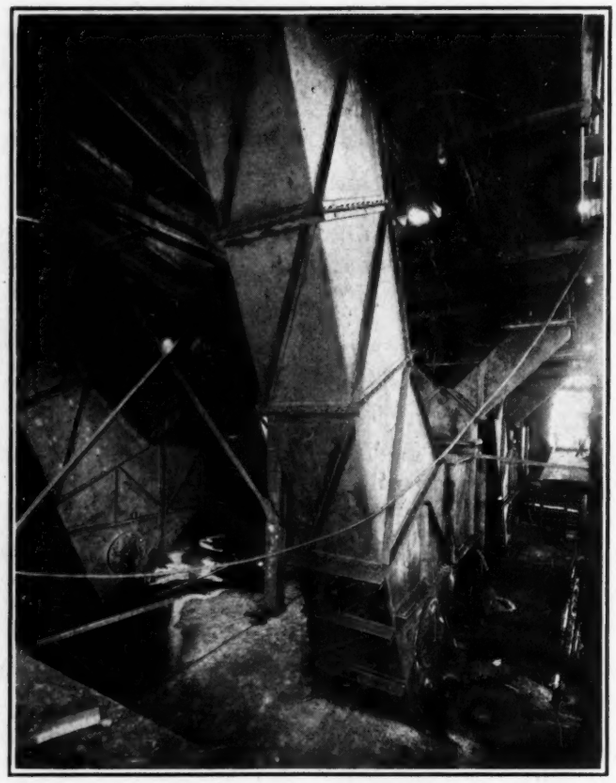


Fig. 8—Sealed Boot Elevators Lift Content of Boxes to Head of Launders for Rewashing

On the right in front is the elevator from the first box, on right in rear can be seen less clearly that from the second box and on left in front is the elevator of the rewash launder, which trough, as can be seen in the photographic illustration of these troughs lies to the left of the main launders.

All parts of the flap gates *C*, *G* and *F* are made of perforated metal. The gate is fastened to a square shaft. It is shown as will be noted, in the closed position.

E is a stationary perforated plate which prevents the passage of refuse through the opening it covers but permits water to pass upward into the launder loosening up the refuse and enabling some of the fine coal to rise and escape capture should any chance to be over the opening to the box.

The counterflow water is used just as much to refill the space voided by the discharge of the rock as to hinder settling of light material. It will be noted that at this first box some refuse passes over as well as all the bone and coal. It is purposely contrived so as to remove only valueless material. The second box removes the rest of the slate and some of the bone, this being returned for rewashing.

By sealing the discharge by a head of water equal to that in the trough the opening *D* is prevented from causing a complete evacuation of the water in the box and in the trough. The refuse drops down into the boot of an elevator, the boot being kept full to the level of the water in the launder.

The free-discharge box shown in Fig. 8 is not really free but is throttled by the smallness of the opening through which the water and refuse pass, but it is rightly termed free because there is no compensating water pressure opposing discharge. By reason of the smallness of the orifice the emission of water from the box is opposed to such a degree that water delivered to the box tends to rise and pass out into the launder carrying with it any light material that may be occupying interstices amid the slate.

At the Loomis breaker three men handle the output of the Rheolaveur which has ranged from 2,291 to 3,116 tons per full working day of nine hours. One man controls the water supply, another tends the washers and a third the shakers. The water supply will not need control when a larger water tank is provided. The work of adjustment is so light all around that it seems possible that the washer of the future may be made almost entirely automatic, the only requirement being that the feed be made reasonably steady throughout the day so as to make conditions more uniform. The use of the middlings as a screen between coal and slate and the repetitive operation of the washer makes the action almost foolproof.

The Rheolaveur side of Loomis breaker occupies about one-third of the structure and is washing more than the other equipment which occupies about one-half of the available space.

The make-up and the circulation water are being lifted by two of the centrifugal pumps made available by the changes in the breaker. They are both of 250 hp. and of excessive capacity for the work they have to perform. The constructors estimate that, as the make-up water needed is only 500 gal. per min., a pump of 30 hp. would be ample. The circulation could be effected with a pump of 150 hp. The six elevators would take approximately 15 hp. each or about 90 hp. or less. The two shaker screens would require about 25 hp. each or 50 hp. in all. This is a total of about 320 hp. How-

ever these requirements do not cover the needs of the free-discharge washer or the sludge and silt conveyors. Adding these, the total power requirements would be about 400 hp. which is approximately one horsepower for each ton of hourly capacity.

The washer has been run continuously by three men who at the beginning were given three days' training. In fifteen days they washed 38,321 tons and the coal condemned for slate weighed 259 tons or 0.67 per cent.

The percentage of bone and coal found in the refuse ran as in the accompanying table.

Coal and Bone in Refuse at Loomis Breaker

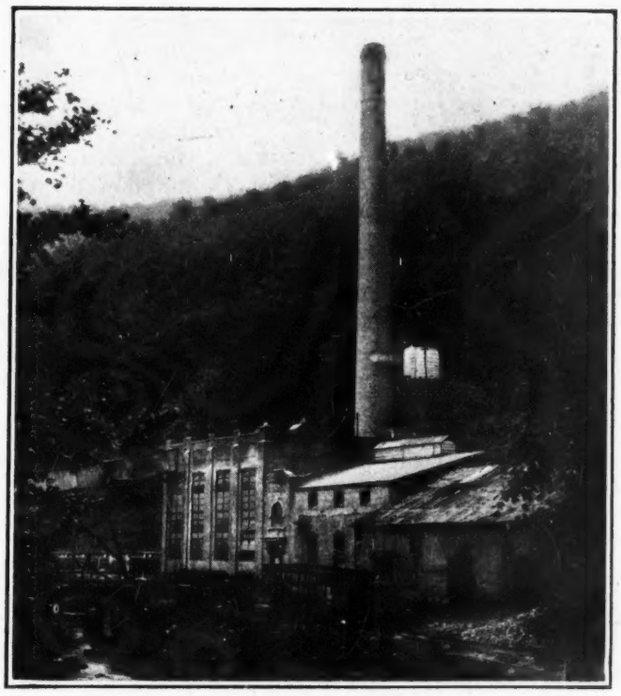
	Bone	Coal		Bone	Coal
Oct. 13.....	0.92	0.67	Oct. 21.....	0.81	0.31
14.....	3.46	1.08	22.....	1.13	0.47
15.....	No rock inspection		23.....	0.67	0.31
16.....	0.72	0.25	25.....	0.50	0.31
17.....	Sunday	....	26.....	0.62	0.28
18.....	0.63	0.21	27.....	0.72	0.31
19.....	2.06	0.94	28.....	0.59	0.31
20.....	0.81	0.31	29.....	John Mitchell Day	
			30.....	0.56	0.28

One Plant Shut Down, Another Started

Two typical examples of the widely varying practices followed in relation to the question of "Purchased Power versus Individual Plants" exist within 10 miles of each other near the east end of the Kentucky-Tennessee state boundary line. The plants in question are shown in the accompanying photographs.

At Fork Ridge, Tenn., which is on a branch line of the L. & N. R.R. out of Middlesboro, Ky., the Fork Ridge Coal & Coke Co. recently shut down a power plant on which approximately $160,000 had been spent for improvements only four years ago. The mine is now operating on power purchased from the Kentucky Utilities Co. C. W. Rhodes, who has been managing the coal company for the past year, states that the cost of purchased power is less than was the operating expense of the plant.

Before this power plant was remodeled in 1922, it contained several horizontal return-tubular hand-fired boilers and three 150-kw., 275-volt belted generating units. In 1922 the old boilers were supplanted by three 250-hp. water-tube units fitted with mechanical stokers and combination forced and natural draft. A mixed-pressure 2,300-volt, 300-kw. condensing turbo-generator was installed to utilize the exhaust from the reciprocating engines. Other improvements included a belt conveyor for transporting coal across a creek, the construction of a spray pond, and a brick stack. Now the entire investment is idle and probably depreciating faster than if it was in use.



Idle Plant of the Fork Ridge Coal & Coke Co.

Excepting the left-hand section and the lower part of the center section, the building is practically new. The coal conveyor enters the upper left-hand corner of the main structure. The brick stack represents a large investment, but in addition to this provision for natural draft, forced-draft blowers are installed in the boiler room.

In contrast to this is the case of a plant at Pruden, Tenn., on a branch line of the Southern R.R. about 20 miles from Jellico. Here the Pruden Coal & Coke Co. put back into service in May, 1926, a central generating plant that had been shut down in May, 1925, in favor of purchased power. C. A. Griffith, manager of this latter company, states that the power-generating cost (not including depreciation and interest) is approximately 3.5c. per ton of coal mined as compared to 5c. when purchased power was used.

The boiler-room equipment at the plant consists of four 150-hp. horizontal return tubular boilers with steam jet-ash conveyor and feed-water heater. Run-of-mine coal is burned. Three units make up the generating equipment. One is a 275-volt direct-current belted set, another a 200-kw., 2,300-volt alternating-current belted unit, and the third a 500-kw., 2,500-volt condensing turbo-generator which was added to the plant in 1919. The average heavy day load is approximately 400 kw., which is carried by the turbine alone. The direct-current generator is used only in case of a breakdown of the substation at mine No. 1 where the power plant is located.

Restarted Plant of the Pruden Coal & Coke Co.

At the left is the tipple of No. 1, the original of the three mines operating from the central plant. At the right is the power company's transformer substation which supplies the mines of some neighboring companies and for a year furnished energy to the Pruden Coal & Coke operations. At the time this photograph was made the power plant was operating non-condensing while repairs were being made to the circulating pump.

Although this old plant has displaced purchased power, Mr. Griffith states that were it a question of equipping a new mine of the same capacity he would not consider the building of a power plant if high-tension purchased power was available. When he shut down the plant in May, 1925, he hoped to sell the equipment. He soon decided that the machinery was depreciating faster when idle than when it was in use, and this factor entered into the decision to again start the plant. He believes that there is a better chance of selling the equipment if it can be seen in operation.

Southern Appalachian Operators Hold Convention

Five Million Tons of Annual Production Represented—Legislation and Traffic Committees Active—Officers Elected—Coal Industry Shown To Be Elastic, Readily Meeting All Demands Made Upon It

By Staff Correspondent

COAL OPERATORS of Tennessee and of the Middlesboro and Jellico fields of Kentucky held their annual meeting and banquet on Nov. 19, 1926, at Knoxville, Tenn. Several of the operators remained for the annual meeting of the Southern Appalachian Efficiency Association, a comparatively new "child" of the Southern Appalachian Coal Operators' Association, which meeting was held the next day.

At the operators' meeting, C. W. Henderson, general manager of the Coalfield Coal Co., and president of the association, presided. According to the report of R. E. Howe, secretary-treasurer, the association now has a membership representing about 5,000,000 tons of annual production. It has also made financial gains during the past year. Reports of the various committees indicated that those on legislation and traffic have been the most active.

In regard to car supply it was brought out that the Southern R.R. owns perhaps less than 50 per cent of the open-top cars moving on its lines, as compared to 60 to 85 per cent for some other important coal-carrying roads.

Mine Efficiency Men Meet at Knoxville, Tenn.

A year ago the Southern Appalachian Coal Operator's Association organized the Southern Appalachian Efficiency Association. The object is to bring together about once a month engineers, mine foremen and superintendents for discussion of safety and increased efficiency. This photograph was made after adjournment of the annual meeting on November 20, so includes only part of the total attendance.

The following officers were chosen to pilot the association for the ensuing year: President, J. E. Butler, general manager, Stearns Coal & Lumber Co., Stearns, Ky.; first vice-president, C. M. Moore, president, Moore Coal Co., Knoxville, Tenn.; second vice-president, H. C. Williams, vice-president, Blue Diamond Coal Co., Middlesboro, Ky.

The following men also were elected to the board of directors:

V. H. Hacker, president, Pruden Coal & Coke Co., Knoxville, Tenn.; G. M. Camp, president, Coal Creek Coal Co., Knoxville, Tenn.; John L. Boyd, manager, Proctor Coal Co., Knoxville, Tenn.; Alexander Bonnyman, chairman of the board of directors, Blue Diamond Coal Co., Knoxville, Tenn.; E. L. Hampton, president, Tennessee Consolidated Coal Co., Nashville, Tenn.; E. C. Mahan, Southern Mining Co., Knoxville, Tenn.; S. S. Pratt, president, LaFollette Coal & Iron Co., LaFollette, Tenn.; R. B. Robertson, president, Black Diamond Collieries, Canton, N. C.; C. W. Henderson, president, Cambria Coal Mining Co. and general manager Coalfield Coal Co., Knoxville, Tenn.; C. W. Rhodes, vice-president and general manager, Fork Ridge Coal & Coke Co., Fork Ridge, Tenn.; B. K. Littlepage, president, Old Straight Creek Coal Corp., Charleston, W. Va.; and J. B. Gatliff, president, Gatliff Coal Co., Williamsburg, Ky.

During the banquet, held at Cherokee Country Club, the retiring president, C. W. Henderson, was presented with a fine watch. But little seriousness was permitted by the toastmaster, Judge H. B. Lindsay. All talks that showed signs of being either serious or lengthy were humorously cut short for the purpose of telling a funny story or to introduce the next speaker. Many officials of the Southern coal-carrying railroads were present.

H. L. Gandy, executive secretary of the National Coal Association, spoke briefly on the public's attitude toward the recent increase in coal prices. He declared that the coal industry deserves commendation from the public for the sudden increase in production which naturally counteracts the tendency toward further price raises.

The annual meeting of the efficiency association was completed in one session held from 9:30 a.m. until noon. The president, W. P. Peck, manager of the Black Diamond Collieries, Coal Creek, Tenn., presided. Few mine foremen were present at this session but several of the operators in attendance signified their intention of having their foremen attend future meetings of this kind.

The first subject, that pertaining to blasting, was presented by W. J. German of Huntington, W. Va., representing the Du Pont company. He described the new developments in explosives and explained the practical phases of shooting. The many questions asked regarding pellet powder showed the interest in this new explosive, or rather, new form of an old explosive, but Mr. German made it plain that this powder is intended only for those mines which insist on using black powder rather than permissibles.

Next J. H. Edwards, associate editor of *Coal Age*, described briefly the systems of increased inside supervision, car dispatching, and of inside mine tool supply which he had observed recently in several mines of small to medium size.

George B. Thom, district mine inspector for the State of Tennessee, next described the rescue work at the Roane Iron Co.'s mine at Rockwood, Tenn. This mine is a drift operation in a bed that is badly broken by faults. It ranges from a few inches to 25 or 30 ft., or even more, in thickness.

The mine covers a large area and the entry, to which the explosion was chiefly confined, is approximately two miles from the portal. Ignition of gas by open lights seems to be the most likely explanation of the

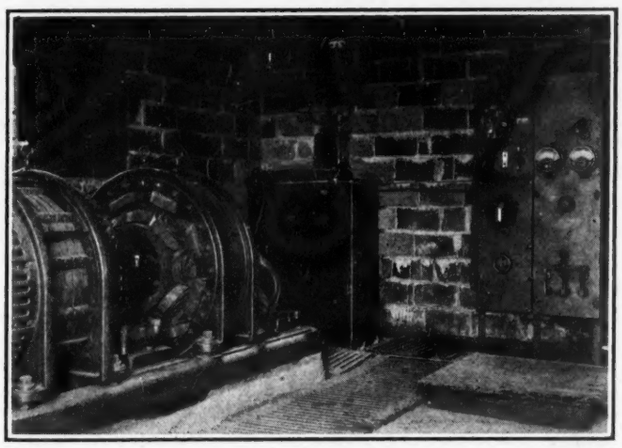
explosion's origin. Presence of considerable coke indicated that coal dust played some part. It was mentioned at the meeting that preparations are now being made to put the mine on closed-light operation.

Newly elected officers of the efficiency association for the coming year are, president, F. A. Signer, Williamsburg, Ky., electrical engineer, Perkins-Mahan interest; vice-president, John W. Howe, general superintendent, Tennessee-Jellico Coal Corp., and executive committee, E. L. Johnson, general manager, Climax Coal Co., Middlesboro, Ky., N. M. Ringsby, mine superintendent, Blue Diamond Coal Co., and W. R. Presnell. Meetings will be held once a month, the next being scheduled for the third Saturday in January, at Knoxville.

Substation Moved to Load Center

With the increase in a mine's development, and as the entries go farther and farther from the central source of power supply, the problem of maintaining the direct current circuits becomes more and more serious. The farther the lines extend, the lower becomes the voltage, with a consequent loss of power on account of low motor efficiency.

Twenty-six years ago the Bulger Block Coal Co. put down a shaft at Bulger, Pa. The source of power supply was at the shaft, and easily met all demands. In the mining operations of the years that followed, the



Operates Unattended

The large steel tank in the corner adjacent to the generator contains the automatic compensator that provides reduced voltage for starting. It also houses an automatic field switching panel for applying the direct current field excitation to the synchronous motor. At the right is the switching apparatus made by the Automatic Reclosing Circuit Breaker Co.

workings were pushed so far from the shaft that the 275 volts generated at the power station dropped to 140 to 145 volts at the No. 8 working face 6,600 ft. away. Because of this low voltage, the motors were overloaded, although they produced but a small percentage of their full horsepower rating.

To overcome this difficulty the company moved its substation from the shaft to the approximate center of the new and future workings. It was decided to make this substation, which was over a mile from the shaft and power house, automatically controlled. Here a 200-kw. generator is driven by a 300-hp., 2,300-volt synchronous motor. Its operation is controlled by an Electric Controller & Manufacturing Co.'s 300-hp. high-voltage automatic compensator, and the switching equipment was furnished by the Automatic Reclosing Circuit Breaker Co.

This station is put into operation from the shaft by closing an oil switch at that point. This starts the synchronous motor as a squirrel cage machine, first at reduced voltage, then at full-line potential. As the motor nears its synchronous speed field excitation is applied, after which it operates as a regular synchronous

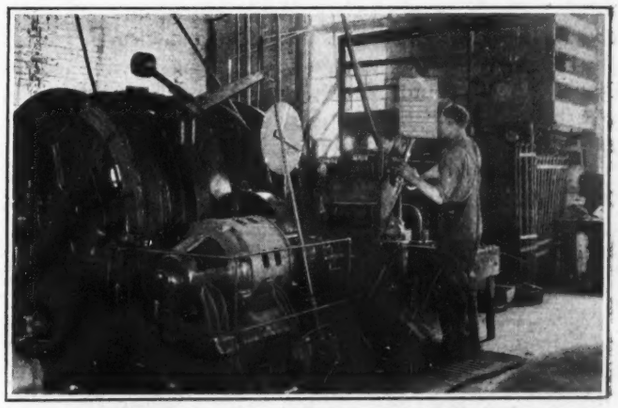
In a Cornfield—But at the Heart of Operations

Moving the center of distribution to a point near the center of load solved the problem of low voltage. The direct current feeder lines here go underground through a bore hole.

machine. There is a definite time interval that must elapse after the motor is up to speed before power is connected to the direct line. This delay assures that the set has become stabilized before the load is applied. A time relay regulates this interval by closing the direct current circuit breaker after the desired time has elapsed.

Overload Protection Is Provided

As the substation is unattended, abnormal conditions must be guarded against. It is protected against overload in both the direct and alternating current circuits. In case of an overload on the direct current system, the switching apparatus for this line automatically recloses after the overload condition is removed. Should the outfit fail to start when the switch is closed, the cur-

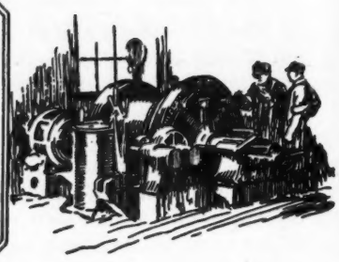


This Man Controls the Substation a Mile Away

At the right of the illustration are the control switches. The substation, through over a mile distant and unattended, is protected from abnormal conditions, both on the direct and alternating current lines.

rent will be cut off from the motor before damage can be done. In such a case, or if an overload opens the synchronous-motor circuit, an attendant must go to the station to determine the trouble. Thus an inspection must be made of the plant before it is again put into operation.

Practical Pointers For Electrical And Mechanical Men



Conveyor Cuts Cost in Material Yard

Handling material is a major problem in coal mining, especially at operations where the inside conditions are favorable. In many such cases supply materials are often handled in the most laborious fashion. Presumably the reason is because of the limited amount of any one material purchased. At the mine of average size it would not be economy to spend any reasonable sum for equipment to handle some one item of material.

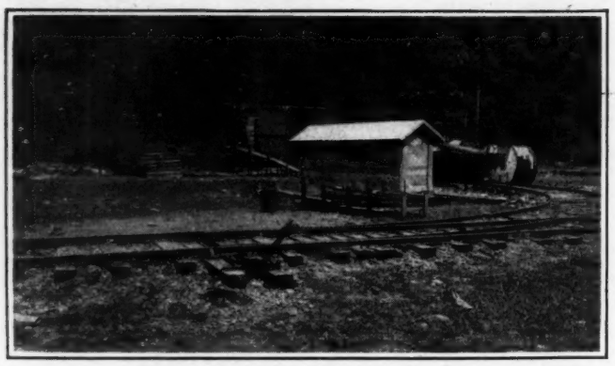
Conveyor in Working Position

The small rollers are mounted on anti-friction bearings so that material will move along by gravity if the conveyor is given a slight pitch. Here the machine is set up for carrying ties from a car to a storage pile, but it is well suited to handling such material as brick.

There seems to be one type of material-handling equipment that could be installed profitably at many mines. This is a gravity roller conveyor. The accompanying photographs show such a device in use at the Dehue, W. Va., mine of the Youngstown Sheet & Tube Co. Although the chief use for this conveyor is for handling brick, the camera caught it conveying sawed ties from a box car to a storage pile.

This conveyor is made in 10-ft. sections that can be handled easily by two men. Horses of graduated heights made by welding together certain lengths of old pipe are used as supports. When not in use the conveyor sections are stored one on top of the other in a narrow portable house which is kept near the center of the yard.

The investment in this conveying equipment is so small that it will pay for itself in a short time in spite of the fact that its use is intermittent.



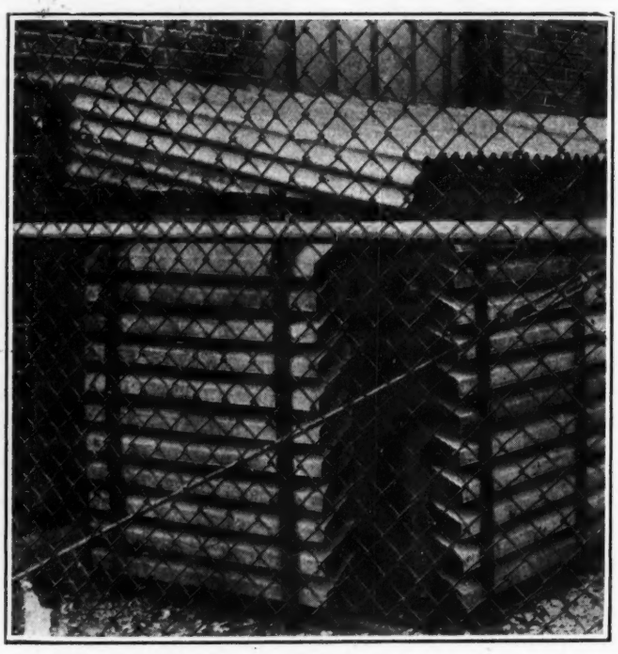
Small House for Conveyor Sections

In this convenient location the conveyor is protected from the weather and miscellaneous damage while not in use. With such treatment its life at the mine is practically unlimited. No doubt one of these gravity roller conveyors would be a profitable investment at many mines.

Hoist Motor Resistance Placed Outdoors

It is not unusual to see instances of overheating of electrical equipment caused, either wholly or in part, by the location of resistors in a small poorly-ventilated compartment or room sometimes together with other electrical apparatus. A satisfactory way to overcome this difficulty is to place the resistors out in a shed having louvered walls.

In the accompanying illustration may be seen a housing of this kind as used at the New Orient mine to provide a place for the rotor resistance of the auxiliary hoist motor. The louvere plates, which are assembled to form a 7-in. wall, are mounted at a 30-deg. angle. The vertical flanges on their sides are 2 in. wide, and the spacing between the edges of these flanges and the adjacent plates is also 2 in. This construction provides for a free circulation of air over the resistors yet protects them from all ordinary storms of rain and snow.



Protection for Resistance

This photograph shows one end of the resistance housing located along the wall back of the hoist house at New Orient mine. The louvered walls allow a free circulation of air.

Longitudinal Pipe Pressed Into Service As Support for Trolley Wire

An unusual type of outside trolley construction was recently installed by the Glogora Coal Co., at Glo, Ky. This work is on a curve near the main portal where three tracks converge and where there must be a wide span between the supporting posts.

It was considered quite desirable, in some way, to arrange the main cross-supports so that they would be above the reach of trolley poles in case the wheels should accidentally leave the wire. The accompanying illustration shows how this was accomplished.

The trolley wire hangers are fastened to 1¼-in. pipe paralleling the track. This is supported by drops of 2-in. pipe from cross-supports made of pipe of like size.

Portion of New Wire Suspension at Glogora

The pipe forming the direct support for the trolley wire is 1¼-in. The 2-ft. drop-pieces and cross-supports are of 2-in. pipe. This type of construction was adopted to bring the cross-supports above the effective range of a "de-trolleyed" pole.

These supports are 9 ft. above the track, whereas, the trolley wire is slightly over 6½ ft. above it. The span, which is 18 ft., is reduced in effect to 10 or 12 ft. by the use of angle braces at the posts.

The use of a pipe, parallel to the trolley, as the direct support, makes it possible to hold the wire to conform to the track curvature. This requires bending the pipe and so fastening it that it cannot turn. This feature however is secondary. As stated before, the reason for the construction is to bring the cross-supports above the reach of trolley poles.

Transformer Oil Should Be Kept Above 10,000 Volts

At some mines the testing and filtering of transformer oil is handled like the repairing of house roofs in certain arid sections. For months at a time a few holes make no difference, and after the unexpected heavy rain comes it is too late to repair. Similarly water and sludge in a transformer cause no inconvenience until the unexpected breakdown occurs.

To forestall trouble from wet or unclean transformer oil requires that at certain intervals the old oil be replaced with new, or that it be treated for removal of impurities. Except where a plant has but a few small transformers and these of small capacity, the best practice is to have the oil tested at regular intervals and filtered as necessary, or to filter it regularly regardless of test.

At the New Orient mine, in Illinois, the practice is to filter the oil from the 33,000-volt transformers once a year, and to filter that from the 2,200-volt transformers often enough (as indicated by tests) to keep it above 10,000 volts. Filtering of the oil in the 33,000-volt transformers is continued each time until it stands 20,000 volts or more across a standard gap. With this practice there is little chance for avoidable transformer burn-outs.

Finding the Number of Poles In an Induction Motor

On direct-current motors, the pole pieces are projections on the inside of the field frame and, therefore, the poles in the machine can be counted, says *Power*. In induction motors the winding is distributed in slots in the inner periphery of the stator core, in much the same way that the winding is placed on the armature of a direct-current machine, consequently, the number of poles in the machine cannot be readily counted. One way of determining the number of poles is from the name plate on the stator.

There is a fixed relation between the number of poles, the frequency of the circuit and the speed of the motor; that is, the number of poles equals 120 times the frequency of cycles, divided by the speed in revolutions per minute. For example, if the frequency is 60 cycles and the speed is 1,150 r.p.m., the number of poles in the motor equals 120 times 60 divided by 1,150 equals 6. It will be noted that this does not come out an even number, which is due to the actual full-load speed being somewhat lower than the theoretical.

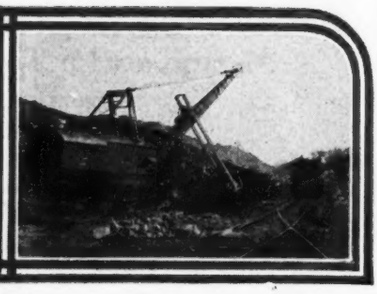
Where the name plate data are not available, the number of poles can generally be determined by the speed of the coil in the stator core. Each coil is placed in slots which are distanced apart about equal to the width of the pole. In a four-pole machine the coil spread will be equal to about one-quarter of the inner periphery of the stator core, and in a six-pole machine the spread will be about one-sixth of the periphery. Owing to the chording of coils they will not, in general, be found to spread full pitch, but will be close enough to check the number of poles.

Removing a Broken Stud

Geo. Wilson in *American Machinist* gives an effective method of removing a broken stud in an awkward place. It was a ⅝-in. stud and the threaded end had broken off. leaving about 1 in. projecting above the casting. This casting was the head of a small compressor and had two cast necks projecting from the surface carrying the stud. In addition to these outlets, there were two valve bonnets held on by similar studs. This construction made it impossible to swing any kind of a wrench on the stud, which was rusted fast.

The scale was cleaned from the end of the stud and a socket wrench made by drilling a ⅞-in. hole in the end of a 1¼-in. square bar. The drilled end of the bar was heated to a bright red and driven down over the stud. Cooling the bar shrunk it tightly on the stud. A wrench applied to the upper end of the bar removed the stud without difficulty. The wrench used exerted about all the stress the stud would stand without twisting off, yet the bar showed no sign of letting go.

News Of the Industry



New Market Possibilities Revealed By Pittsburgh Soft-Coal Conference, Is Belief of Federal Fuel Specialists

By Paul Wooton
Washington Correspondent of *Coal Age*

The International Conference on Utilization of Bituminous Coal, held at Pittsburgh, made a deep impression on the government's coal specialists who attended. The vista of a new market was opened to the coal industry. Many were convinced that the time is at hand, in Europe at least, when coal will be converted into oils, including gasoline or substitutes, which will yield the same service in internal-combustion engines.

In view of the rapid strides which have been made they see a great secondary reserve of oil being opened up. It is analogous in many ways to the secondary reserve in oil shales.

It has been common knowledge for a long time that it is physically possible to get oil from oil shale. New developments show it to be physically possible to get oil from coal on a large scale. There is no proof as yet as to whether these byproducts can be produced at a cost above or below that of recovering oil from shale. There is no convincing evidence that the methods of conversion can compete with 21c. gasoline. There is a good deal of evidence, however, that motor fuel from coal can compete at prices not greatly in excess of those prevailing in Europe for gasoline.

The great advance revealed at the Pittsburgh conference is in the quantity of gasoline and substitutes which it now is possible to produce from a ton of coal. It has been known for a generation that a good substitute for gasoline could be made by coking coal in byproduct ovens and stripping benzol from the gas. Benzol has been selling in recent years for 4c. or 5c. more than gasoline as a blending agent that is much prized by refiners. The quantity of benzol that is recovered from a ton of coal, however, is quite small in comparison with the country's needs, even after years of development under the skillful hands of the leading plants now active in the byproduct industry. The average yield of benzol or its equivalents per ton of coal coked was less than 3 gallons. At this rate, if the entire output of bituminous coal should be coked, the yield would be only a seventh part of the country's present consumption of gasoline. Of course it would be utterly impracticable to coke all of the coal because of lack of demand for the coke or the gas.

Knowledge of this fact had directed attention to processes of coking at low temperatures, which in the laboratory sometimes showed yields of 30 gallons of oily or tar products, but in spite of years of experimentation in Great Britain and in the United States no one of the twelve or more principal methods of low-temperature carbonization yielded much above 15 gallons of liquids and most of the product was not a substitute for gasoline. The yield of motor spirit from these processes was not much better than that from high-temperature coking—usually less than 5 gallons to the ton. New processes, however, developed in France and Germany, and discussed at the Pittsburgh conference, claim yields of from 40 to 200 gallons to the ton, with consequent decrease in the amount of residue to be disposed of.

Bergin Process Plants Working

The Bergin process, based on the hydrogenation of the coal substance, has reached the point, according to Dr. Bergius himself, of commercial development. One plant with a capacity of 100,000 tons per year and another of 30,000 tons capacity are said to be under construction. The other processes turn on the complete gasification of coal and the production of motor fuel by the synthesis of carbon monoxide and hydrogen. By this route it has been possible to make methanol at a price which made it seem a possible competitor of gasoline, and to make another mixture of alcohol and oily products, developed by Fischer, under the name of synthol.

At the Pittsburgh conference Fischer announced that even a more direct step was possible—the synthesis of gasoline directly from carbon monoxide and hydrogen derived from the gasification of coal but carried on at atmospheric pressures instead of at extremely high pressures as had been used in the earlier processes.

These last advances offer important economies in costs because of the heavy capital investment in equipment necessary to withstand heavy pressure. There could be no doubting that Fischer's work is in an experimental stage, but it apparently has promise.

These developments are regarded as of great interest to the fuel industries of the United States. Since these new processes cannot compete at present prices of gasoline, they do not threaten dangerous competition to the petroleum industry, but rather open a supply of raw material which can be used when flowing oil is gone. It seems likely to make possible the preservation of the heavy investment in refining and distributing systems. None thinks that these new processes are likely to be used in the United States for many years, but if they begin to find use in Europe they will help to absorb the potential overproduction of soft coal which bears down upon the coal industry of the whole world. Before cheap American petroleum is exhausted it is believed to be entirely possible that these processes indirectly would broaden the export market for American coal.

EDITOR'S NOTE—*The foregoing Washington letter reflects certain views of official Washington. Due to the fact that policy as a rule prevents government officials from permitting their views being quoted directly, the authority for these reports is necessarily somewhat vaguely referred to. The views reflected are not those of any one group of officials, but of different men, in the legislative and executive departments. There is no necessary connection between their views and* COAL AGE *editorial policy; neither do they necessarily represent Mr. Wooton's personal views. It is felt that the opinions thus faithfully reflected will be of great interest to the industry. Where opinions are cited from sources outside of the government, the source will be specifically stated.*

Efficiency of Coal Blocks Hydro-Electric Growth

One of the reasons why hydroelectric power has not been developed to a greater extent in the United States is the higher efficiency of good coal, said Francis Hodgkinson, consulting mechanical engineer of the Westinghouse Electric & Mfg. Co., Pittsburgh, Pa., speaking recently before a joint meeting of the Western Society of Engineers and the Chicago section of the American Institute of Electrical Engineers at Chicago. He declared 1 lb. of good coal, under the boilers of a modern electric central station, will produce as much electric energy as ten tons of water falling 100 ft. "I do not doubt that a steam plant in the neighborhood of Niagara Falls would, if given a high load factor, produce energy more cheaply than can Niagara Falls."

Mining Congress to Study Standardized Equipment And Practice in Mining

Progress toward standardization of mine equipment and mine practices will be reviewed before special meetings of the National Standardization Division of the American Mining Congress, by Col. Warren R. Roberts, of Chicago, chairman, as part of the program of the 29th annual convention of the American Mining Congress, at the Mayflower Hotel in Washington, Dec. 7 to 10. The standardization conference will be held the afternoon of Dec. 9 and the following morning. Colonel Roberts will present his annual report on the afternoon of Dec. 10 before a general convention session.

Reports of the various committees of the Standardization Division will deal with standards proposed or changes suggested in present standards, covering the following: Mine ventilation, mine drainage, underground transportation, outside coal-handling equipment, mine sampling, mechanical loading underground and fire-fighting equipment. The Mining Standardization Correlating Committee will meet concurrently and will consider reports for review as tentative American standards as they apply to both coal and metal mining.

The Tuesday morning session will be devoted to the general topic, "The State of the Industry," with H. W. Seaman presiding. Dr. E. W. Parker, Anthracite Bureau of Information, will cover the hard-coal industry, and Walter Barnum, president, National Coal Association, will speak on bituminous. "Politics and Natural Resources" will be the subject of the afternoon session. George B. Harrington, president, Chicago, Wilmington & Franklin Coal Co., will be the presiding officer. Harry L. Gandy, executive secretary of the National Coal Association, will present the case against government interference, and former Representative F. W. Mondell of Wyoming will discuss the control and disposition of public lands. Nathan B. Williams, counsel for the National Manufacturers' Association, will close the formal talks with an address on "A Sensible Application of Our Anti-Trust Laws."

Labor will be the problem before the Congress at the Wednesday morning session, presided over by Harry N. Taylor, president, U. S. Distributing Corporation. J. J. Davis, Secretary of Labor, will be the first speaker. J. G. Bradley, president, West Virginia Coal Association, will outline the labor problem in coal. "Stabilizing Mineral Production" will be the theme of the afternoon meeting, with Mr. Taylor talking on the possibilities of marketing revolutionizing the coal industry and Eugene McAuliffe, president, Union Pacific Coal Co., contributing a paper on reducing operating costs through greater mechanization. Sidney J. Jennings will preside.

Taxation will be the featured subject at the Thursday sessions, presided over by Mr. Bradley and S. Pemberton Hutchinson, president, Westmoreland Coal Co.

More Trackage Needed To Handle Freight

Former Governor John J. Cornwell of West Virginia, general counsel for the Baltimore & Ohio R.R., speaking at the thirteenth annual dinner of the Traffic and Transportation Association of Pittsburgh in the Schenley Hotel, on Nov. 18, said the limit in weight and length of freight trains had been reached and that the problem before the railroads now, with virtually their total facilities in use to handle traffic, was how to meet expansion in business with a corresponding increase in transportation service.

This could be done, said Mr. Cornwell, only by additional main-line trackage and yard facilities to handle the additional equipment that would be called for. Railroad management, he said, had reached the zenith of operating efficiency.

Glendale Blast Due to Gas Ignited by Electric Flash

An electric flash from a trolley locomotive in the presence of gas, which had accumulated as the result of a door being broken, is given as the cause of the explosion on Nov. 15, which killed five men in the Alexander mine of the Glendale Gas Coal Co., at Moundsville, W. Va. The mine was rock-dusted. The opinion is strongly advanced that rock dust on the haulway of the affected section, together with water in two back entries, prevented coal dust from propagating the explosion to other parts of the mine. An inquest on the explosion was held in Moundsville on Nov. 26, a detailed report of which will appear in a later issue of *Coal Age*.

Britain Rapidly Reviving From Coal Strike; District Agreements Under Way

Great Britain's coal industry is recovering rapidly from the blight of the strike which collapsed a fortnight ago.

District agreements have been reached in all areas except Durham, South Wales and Cumberland. In the past few days negotiations for the return of the strikers were concluded in Scotland, Lancashire, Cheshire, Nottinghamshire, Derbyshire, Northumberland and Yorkshire. Derbyshire, Nottinghamshire and Yorkshire miners have agreed to a seven and one-half hour day; in Northumberland the coal cutters will work seven hours, but other mine labor will have an eight-hour day. Scotland and Lancashire also will be on the eight-hour basis. The agreements being made run from two to five years.

The fact that the contracts extend over such periods is considered insurance against any attempt by A. J. Cook, general secretary of the British Miners' Federation, to create further disturbances when the industry has recovered a more favorable economic status. "Settlements so far concluded or under negotiation," said Sir Philip Gee, of the British Mine Owners' Association, "suggest that the influence of the communists should be heavily discounted and that there are real possibilities for enduring peace."

Production the current week is expected to reach 2,000,000 tons. At the end of last week there were 428,000 men back at work and this number will be swelled this week. The government has lifted its restrictions on inland coal consumption and domestic rationing was discontinued on Nov. 29. The export embargo, however, is still effective and bunkering is on a permit system. The general emergency regulations probably will be continued for another month.

Wide World Photos

British "Cash and Carry" Coal Trade

In the poorer sections of London the children of some families carry home the family fuel supply. When 28 lb. (2 stone) or less is ordered at a time the coal is delivered over the counter without obtaining a permit, such precaution being necessary during the strike when larger quantities are desired.

Sponsors of Coal Legislation Ready to Renew Fight

Another attempt to enact coal legislation designed to guard against future fuel emergencies due to strikes will be made during the short session of Congress, which will convene Dec. 6, according to advices from Washington. Representative James S. Parker states that the Committee on Interstate and Foreign Commerce of the House, of which he is chairman, has agreed to take up coal legislation as its first order of business. Representative Meyer Jacobstein of Rochester, N. Y., also has indicated that the move he made for such action in the last session will be renewed.

Senate advocates of coal legislation will not be idle during the short session, for Senator Royal Copeland of New York declares he will press for action on the coal bill he introduced during the long session of the 69th Congress. Senator Copeland and Representative Jacobstein last spring presented similar coal measures in the Senate and House, respectively. The Senate Committee on Education and Labor favorably reported the Senator's bill, but the Jacobstein measure is still before the Parker committee. Representative Parker's bill, though worded differently, is practically identical in effect with the Copeland-Jacobstein bill.

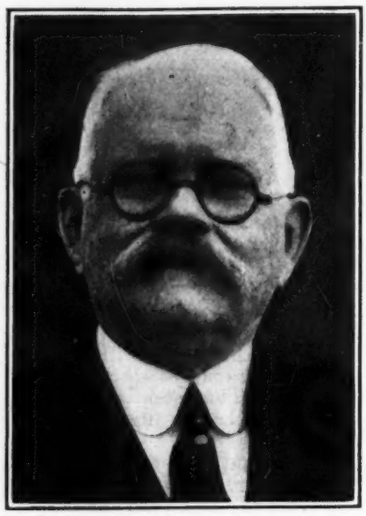
President Coolidge is putting the final touches on his message to Congress, which is understood to contain reference to coal legislation. The message probably will be presented Dec. 7.

Oddie Urges Funds for Study Of Mining Economics

If adequate provision is not made in the estimates of departmental expenditures to be presented to Congress Dec. 6 for the economic work of the Bureau of Mines, Senator Oddie, chairman of the Committee on Mines and Mining, will appeal to friends of the mining industry in Congress to override the budget. No less than $100,000 should be provided for this new work, Senator Oddie believes. He points out that there long has been need for federal studies dealing with the business side of mining, but now that they had been requested formally by a committee representing all branches of the mining industry there can be no good reason why a respectable start on such work should not be made next year.

The Nevada Senator calls attention to the fact that Washington is a great clearing house of information regarding any agricultural commodity, but he has found from experience that no government agency is in a position to give information concerning the current situation surrounding the metals or to interpret developments in that field.

Judging from certain things which have happened in the past Senator Oddie would not be surprised if some zealous budget official incapable of grasping the fine conception of extending to mining some small proportion of the splendid economic service rendered by the government to agriculture should have applied the ax to this particular item.



John Markle

C.M.I.A. Meets Next Week

On Dec. 8-10 the Coal Mining Institute of America will hold its fortieth annual meeting at the Chamber of Commerce Auditorium, Pittsburgh, Pa. The first day will be devoted to coal preparation. E. A. Holbrook, dean of the School of Mines, Pennsylvania State College, will introduce the subject. J. R. Campbell, representing the Rheolaveur Co.; Dever C. Ashmead of the Hydrotator Co., Andrews Allen of the firm of Allen & Garcia, consulting engineers; Ray W. Arms of Roberts & Schaefer Co., and Thomas M. Chance, a consulting engineer, will present papers on methods and installations of coal-cleaning plants. The practical mine official who is concerned with the proper preparation of coal at the face by the miner has his chance in the question box. Edward F. Shelby, Uniontown, Pa., will lead the discussion on three questions of management in relation to quality. They are: "What is the best system for getting coal mined cleanly in your district?"; "In the preparation of coal which sizes would be liable to contain the most impurities?" and "What effect will loading machines have upon the preparation of coal?"

G. H. Ashley, State Geologist for Pennsylvania, and Eugene Auliffe, president of the Union Pacific Coal Co., will deliver the addresses at the Institute's annual banquet, Dec. 8.

W. R. Chedsey will read a paper by Wm. Carson of Kaitangata, New Zealand, on "Spontaneous Combustion and Underground Fires in Coal Mines," followed by a discussion. J. J. Forbes of the U. S. Bureau of Mines will talk on "Safety Sanders for Mine Locomotives." Thursday morning's question box will be handled by J. W. Paul of the U. S. Bureau of Mines and will be mainly devoted to safety. N. D. Levin, Columbus, Ohio, will open the afternoon session by presenting a paper on "Concentrated Systems in Coal Mining." The question box, to be led by H. W. Howarth, will discuss the accident liability when using concentrated mining. The session also will consider how to enlist labor's co-operation in accident prevention.

Offer Jeddo-Highland Bonds; John Markle Retires

A new $4,000,000 issue of first mortgage leasehold sinking fund 6 per cent gold bonds of the Jeddo-Highland Coal Co. (the Markle anthracite properties) is being offered by a syndicate composed of Drexel & Co., Lee, Higginson & Co. and Cassatt & Co. This company controls and operates over 6,400 acres of workings located in the northeastern part of the anthracite field near Hazleton, Pa. For the past 17 years the earnings have averaged over $1,460,000 annually.

Proceeds of the issue and the delivery of $1,255,000 non-interest bearing second mortgage bonds constitute in part the consideration to be paid John Markle for 50 per cent of the stock of the company and 50 per cent of the stock of Jeddo Supply Co. Except for the retirement of John Markle, the management will remain the same. Donald Markle is president and A. B. Jessup, vice-president and general manager.

New C. & O. Link Approved By Commerce Commission

The Interstate Commerce Commission on Nov. 23 approved of the plan whereby the Chesapeake & Ohio Ry. will proceed with the construction of sixty-five miles of new line in Ohio incidental to the Nickel Plate merger. The new line will run from Gregg to Valley Crossing, providing much better transportation facilities north of the Ohio River for coal moving up from eastern Kentucky and West Virginia. Under the new plan the C. & O. was authorized to take over and control a new corporation, the Chesapeake & Hocking, and the Hocking in turn was authorized to issue $700,000 in common stock and $12,500,000 in promissory notes, which will finance the new line.

Restore Lower Wage Rate In Cumberland Field

Miners in the Cumberland (Md.) field who were granted $1.31 per ton for pick mining and $7.25 a day for mine labor on Nov. 1, go back to $1 a ton and $5 a day Dec. 1 as a result of the slump in exports occasioned by the collapse of the British strike. Approximately 600 miners are affected.

Joint Coal Line Approved

Approval of joint action by the Pennsylvania, Baltimore & Ohio and New York Central railroads in organizing the Monongahela Railway Company, to develop a Pennsylvania coal area in Washington County, was granted Nov. 29 by the Interstate Commerce Commission.

The Monongahela corporation, which will be owned jointly by the three larger systems, will take over the Chartiers Southern R.R. and the Indian Creek & Northern. It will lease the Catawba and Paw-Paw branches of the Baltimore & Ohio and will acquire trackage rights over adjacent parts of the Pennsylvania System.

Lake Rate Hearing in Washington Drags to Dull Finish with Session In Which Tariffs Get Scant Notice

By Sydney A. Hale
Associate Editor, *Coal Age*

The last witness has testified and the last exhibit has been filed in *Lake Cargo Coal Cases, 1925.*

Final hearings before Interstate Commerce Commissioner Hall and Examiners Gerry and McGrath came to a weary close late Nov. 23 before a diminishing gallery of counsel, railroad officials and coal operators. Briefs have been set for mid-January, with reply briefs ten days later. Oral argument will he heard as early in February as the schedule for the Commission will permit.

The evidence presented the last day of the hearings was a potpourri of testimony on taxation, wage rates, coal seams, screening facilities, market prices, automobile ownership by miners, competition for labor, overdevelopment and marketing. Occasionally a witness or one of the array of counsel would mention the subject of freight rates from the mines to the lake ports. Little time, however, was wasted in discussion on that topic as complainants sought to rebut all the claims made by defendants and intervening Southern operators in earlier hearings.

J. B. L. Hornberger, vice-president and controller, Pittsburgh Coal Co., contrasted the tax burdens of the Pittsburgh field with those laid upon operators in southern West Virginia. Taking his own company and the Island Creek Coal Co. for illustrative purposes, the witness testified that increasing output by the West Virginia produced had reduced its tax burdens from approximately 5.5c. in 1923 to 2.88c. in 1925. During the same period decreasing output had increased the tax burdens of the Pittsburgh company from 10.55 to 42c. per ton.

Norman Takes a Hand

J. Van Norman, of counsel for the Southern operators, wanted to know whether the Commission should establish a rate schedule which would allow Pittsburgh to earn interest and pay taxes on acreage valued at high figures. The witness retorted that he had introduced the question of taxation only because James D. Francis, vice-president, Island Creek Coal Co., had put tax questions into the record.

At another point in the testimony witness and counsel engaged in a fruitless war over a statement that the constitutional rights of the Northern operators had been invaded and that they had been deprived of their property without due process of law. For a moment Mr. Hornberger put the original decision of the Commission denying complainants relief into the category of a denial of due process, but speedily withdrew that imputation.

The "curse" of the bituminous industry, declared Mr. Hornberger, was the development of the Southern fields a half century ahead of their time. That development, he insisted, was responsible for the unproductive acreage carried by the Northern producers. He did not, he explained, wish to be understood as contending that no mines should have been opened in West Virginia and eastern Kentucky before the exhaustion of the coal measures of western Pennsylvania and northern Ohio, but felt that Southern development should have been limited to supplying markets to which the Southern mines had the short haul. "We conceded you the Southern markets years ago," he added.

"You didn't withdraw until you were driven out by Southern competition, did you?" thundered Mr. Norman.

"Not So," Says Findlay

Harry L. Findlay, vice-president in charge of sales, Youghiogheny & Ohio Coal Co., was the next rebuttal witness. Mr. Findlay denied that the complaining districts had lost business because their preparation equipment was not up-to-date. The Pittsburgh seam, he testified, was naturally clean and impurities could be removed at the face. Some of the Southern seams, he continued, are inherently dirty, making more elaborate screening and picking in the topworks necessary. Despite this difference, the witness stated that a number of his mines were equipped with mechanical preparation devices and took exception to the failure of the defendants to take such equipment into account. He admitted, however, that his company seldom gave out any information as to its equipment, operations or prices.

Mr. Findlay renewed an attack, voiced earlier through his counsel, on the accuracy of *Coal Age* market quotations. He said that his company never gave out any figures. Confronted with U. S. Bureau of Mines data which showed a close approximation to the average spot prices reported by *Coal Age*, the witness denied all knowledge of the government figures, thought they must be unreliable and, when asked to read these figures into the record, wanted to know "what trap" there was in them. Commissioner Hall remarked, after examining the witness, that, if Mr. Findlay's statements were to be accepted, there was no source to which the government might turn for accurate information as to market trends.

Old mines, said Mr. Findlay, are not necessarily the most expensive to operate. As a matter of fact, some of the oldest operations of his company are the cheapest to run. The No. 8 field, he pointed out, did not enjoy the same wage flexibility as the Southern districts. Ohio wage rates were fixed by contract and only once in the twenty-eight years in which the Ohio operators had been dealing with the union had there been a reduction.

According to the witness there is little demand for the sizing of No. 8 coal except in the domestic trade. The lake trade is calling for more slack and he predicted that the day is not far distant when the docks will buy nothing but straight mine-run and do all the screening at the Head of the Lakes. The growth of the use of pulverized fuel also will have its effect upon sizing. With an even break in prices f.o.b. the Lake Erie docks, he said, many of the railroads which have switched to Southern coals would return to the use of No. 8 for locomotive fuel.

Could Double Lake Traffic

George Durham, vice-president and general manager, Wheeling & Lake Erie R.R., said that his road could handle double the lake cargo coal tonnage it transported in 1923 with economies in operation and no interference to other traffic. George W. Oliver, transportation analyst, was the last witness heard. He renewed his earlier contention that the Northern lines could reduce rates on coal traffic and paid his respects to statistical testimony offered by opposing witnesses.

The complainants in these proceedings, successor to a line of complaints which began over fifteen years ago, were filed with the Commission in 1923. After extended hearings the examiner who presided presented a tentative report recommending reductions in the Northern and increases in the Southern rates. The Commission, however, refused to disturb the adjustment and dismissed the cases in a decision handed down in July, 1925. As a result of wide spread demands for reconsideration, the case was reopened for the taking of further testimony. Hearings were held at Atlantic City in July and at Washington in October and November.

Steam to Hold Leadership On Railroads, Says Loree

The steam locomotive, and not electricity, will continue to be the dominant factor in the development of railroad transportation, said L. F. Loree, president of the Delaware & Hudson R.R., in a speech accepting the 1926 medal of the Holland Society at the autumn meeting of the organization at the Hotel Astor, New York City, on Nov. 26.

"The substitution of electric haulage for steam railway transportation is widely urged," said Mr. Loree. "While this contest may be expected to continue long in the future, perhaps usurping and stabilizing itself in restricted fields, the dominance in its larger aspect will depend largely upon the ability, genius, courage and tenacity of the exponents of one or the other method of transportation. For myself, I have an abiding faith that for the main purpose of the railroad — the transportation over long distances of heavy articles— the steam locomotive will be dominant."

Coal-Mine Accidents In October Kill 209; Ratio to Output Rises

Accidents at coal mines in the United States during October, 1926, caused the loss of 209 lives, according to information furnished by state mine inspectors to the U. S. Bureau of Mines. The fatality rate for the month, based on 63,267,000 tons of coal produced, was 3.30 per million tons as compared with 3.04 for October last year. The fatality rate for bituminous coal mines alone for October of this year was 3.21 and for anthracite 3.92. Last year the fatality rate for the month was 3.01 for bituminous, but the rate for anthracite was not comparable owing to a suspension of work in that branch of the industry.

During the first ten months of the current year the production of bituminous coal totaled 460,898,000 tons while the anthracite output was 70,027,000 tons. The number of deaths occurring at bituminous mines during this period was 1,657 and at the anthracite mines 361, showing a fatality rate of 3.60 for bituminous mines and 5.16 for anthracite mines, as compared with 3.48 and 6.38 respectively for the first ten months of 1925.

During the month two "major" explosions occurred—in which 5 or more lives were lost. These two explosions bring the number of "major" disasters in 1926 to 14 with an aggregate loss of 307 lives, as compared with 10 such accidents and 199 fatalities for the same period in 1925. The per-million-ton death rate for both bituminous and anthracite mines based exclusively on these disasters was 0.58 this year as compared with 0.41 for the ten-month period last year.

An examination of the causes of the fatalities reported thus far in 1926 and a comparison of the records with those for January to October, 1925, show reductions in the fatality rates for falls of roof and coal, and for explosives, but slight increases in the accident rates for haulage, electricity, and explosions. The comparative rates for these accidents were:

	Year 1925	Jan.-Oct. 1925	Jan.-Oct. 1926
All causes	3.811	3.849	3.801
Falls of roof and coal	1.842	1.871	1.789
Haulage	.615	.619	.657
Gas or dust explosions	.590	.576	.699
Explosives	.174	.183	.132
Electricity	.144	.147	.151

Illinois Coal Shipped to New Orleans in 42 Hr.

Two trainloads of southern Illinois coal, comprising 4,000 tons each, which left Zeigler recently via the Illinois Central R.R. for New Orleans, consigned by the Bell & Zoller Coal Co. for shipment to Great Britain, made the trip to the Crescent City in forty-two hours. This is said to establish a record for such shipments. When, a few weeks ago, for the first time in history a consignment of Illinois coal was loaded for Europe, the time required to reach New Orleans was fifty-one hours.

Eight Days in Flooded Mine, Five Rescued Alive

Eight days of uninterrupted rescue work brought its reward on the night of Nov. 24, when five of six men who had been entombed in the flooded workings of the Tomhicken mine of the Lehigh Valley Coal Co., near Hazleton, Pa., were taken out alive. Although little hope is held out for the rescue of the sixth man alive, the pumps are kept busy and workers are continuing to clear the way into the workings where he was last seen.

Rescuers have been working feverishly in three shifts a day since Nov. 16, when the Black Creek broke through its banks.

When the rescue took place these officials of the Lehigh Valley Coal Co. were present: Thomas Thomas, general manager; Harry W. Montz, assistant manager; Paul Sterling, chief engineer; George Wood, superintendent Coxe division; Sheldon Jones and others. Mine Inspector D. J. Roderick was on the scene continuously and had little sleep during the battle against the flood.

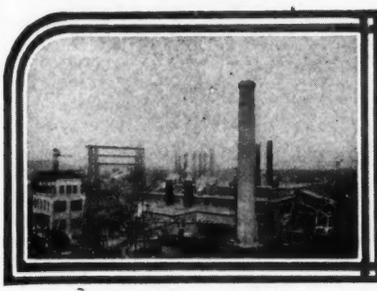
The imprisoned men were found in what was known as the No. 8 tunnel, where they had taken refuge above the water line. They witnessed the rising and lowering of the flood waters from their position. The rescued men are Henry Kirchdoerfer, assistant foreman; August Yenchick, Michael Lawrence, John Gondera and John Lorinez. All are residents of Tomhicken.

Officials of the Lehigh Valley Coal company fix the cost of the rescue work at $100,000.

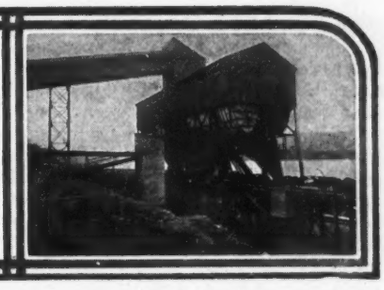
Coal-Mine Fatalities During October, 1926, by Causes and States

(Compiled by Bureau of Mines and Published by *Coal Age*)

State	Underground											Shaft				Surface							Total by States	
	Falls of roof (coal, rock, etc.).	Falls of face or pillar coal.	Mine cars and locomotives.	Explosions of gas and dust.	Explosives.	Suffocation from mine gases.	Electricity.	Animals.	Mining machines.	Mine fires (burned, suffocated, etc.).	Other causes.	Total.	Falling down shafts or slopes.	Objects falling down shafts or slopes.	Cage, skip or bucket.	Other causes.	Total.	Mine cars and mine locomotives.	Electricity.	Machinery.	Boiler explosions or bursting steam pipes	Railway cars and locomotives.	Other causes.	Total.	1926	1925
Alabama	5		3				2					10													10	9
Alaska																									0	0
Arkansas	1											1										1		1	2	1
Colorado	1		3									4													4	4
Illinois	7	1	3		1							12													12	9
Indiana	2		1		2							5													5	12
Iowa			1									1													1	0
Kansas	1											1			1		1								2	0
Kentucky	8		3	1	1		2		1			16													16	14
Maryland	2	1										3													3	1
Michigan																									0	1
Missouri	1											1			1		1								2	0
Montana																									0	2
New Mexico																									0	0
North Dakota																									0	3
Ohio	6											6													6	6
Oklahoma															1		1								1	2
Pennsylvania (bituminous)	16	3	4	1			2				2	28										1	1	2	30	29
South Dakota																									0	0
Tennessee				27								27													27	2
Texas																									0	0
Utah	1											1													1	2
Virginia	5		1								1	7													7	5
Washington	1											1													1	4
West Virginia	26		9				2		1		1	39						2	3				1	6	45	53
Wyoming																									0	1
Total (bituminous)	83	5	28	29	4		8		2		4	163			3		3	2	3			2	2	9	175	160
Pennsylvania (anthracite)	15	3	2	9	3						1	33								1				1	34	2
Total October, 1926	98	8	30	38	7		8		2		5	196			3		3	2	3	1		2	2	10	209	
Total October, 1925	93	5	25	9	3		13		1		4	154					1	1	1	1		2	2	7		162



News Items From Field and Trade



ALABAMA

To End Convict Leasing.—The bill to abolish the convict lease system which the next administration will present to the State Legislature is certain to be made a law, according to a statement by W. C. Davis, Lieutenant Governor-elect. "Members of the next Legislature," Mr. Davis said, "have indicated their desire to see this system abolished within the next year." Mr. Davis said he spoke in part on behalf of Colonel Bibb Graves, Governor-elect.

The St. Louis & San Francisco R.R. will operate trains directly into Mobile by a traffic arrangement with the Alabama, Tennessee & Northern R.R. It will be necessary to construct a 30-mile line between Summit on the A. T. & N. to Mobile, which it is stated will be ready for operation by the time the Aberdeen-Kimbrough line of the Frisco is completed, giving that line physical connection with the port of Pensacola. The recent acquisition of the Muscle Shoals, Birmingham & Pensacola and the connection with the A. T. & N. will enable the Frisco to transport coal from the large number of mines it serves in Walker County over its own rails to Pensacola and Mobile. The Frisco has modern coal terminals and wharf facilities at the Florida port.

Three Deepwater Mines Leased.—The Deepwater Coal & Iron Corporation is reported to have leased its West Corona, Big Ridge and No. 3 mines, in Walker County, to James Gallagher, Jr.

Takes Over Barney Mines.—The Alabama-By-Product Corporation has acquired the Barney mines of the Barney Coal Co., in Walker County, near Cordova. This operation is now producing about 350 tons per day, but the output will be increased to help meet the urgent demand which the corporation now faces for coal, and the working forces and equipment will be supplemented accordingly. The offices of the corporation are in Birmingham, Ala.

ARKANSAS

Union Local Formed.—A new mine union local has been chartered at the Earl Johnson mine, Paris, according G. E. Mickel, international Board member from District No. 21, United Mine Workers.

Miners Sue for Wages.—Labor claims totaling $1,700 against the Paris Valley Coal Co. have been filed in the court of Justice A. L. Horne at Paris by L. J. Arnett, attorney for thirty-one coal miners. The suits are directed against Albert Morris and L. J. Langston, mine operators. It is alleged that the operators drew the money from the bank to meet the payroll, and they failed to pay off and left the state. An attachment is asked for the coal that could be found around the mine.

COLORADO

Fire Damages Pikeview Mine.—Fire on Nov. 16 caused $9,000 damage to the tipple of the Pikeview mine, five miles north of Colorado Springs. A high wind hampered efforts of Colorado Springs firemen during a three-hour battle with the flames.

ILLINOIS

Output Below a Year Ago.—Illinois mines produced 6,456,241 tons of coal during October, according to a report by A. D. Lewis, director fo the state Department of Mines and Minerals. The tonnage in October, 1925, was 6,834,514. The report shows 59,810 men were employed in October and averaged 18.5 working days for the month. Twelve men were killed and 2,213 injured during the month, losing a day or more each. Sixteen mines in Franklin County employing 13,040 men produced 1,615,274 tons during the month, while 14 mines in Sangamon County produced 525,270 tons.

The Odin coal mine, Centralia, which had been idle for seven moths, has resumed the production of coal. The mine will work at capacity, which is 250 men. Its tonnage capacity is about 1,100 a day.

Hagist Now Heads Kolb Company.—E. B. Hagist, Mascoutah, has been elected president of the newly reorganized Kolb Coal Co. The company has five mines, which will be placed in operation at once.

A deal has been closed at Edwardsville through which Oliver L. Winkel of St. Louis, head of a St. Louis coal agency and interested in a Perry County mine, has taken over the lease of the property of the Madison County Mining Co. He relieves F. W. Lannae of obligations the latter assumed two years ago. Winkel has no particular changes in mind other than increasing the supply of coal.

Williamson County Mines Hum.—Peabody mine No. 3, located near Marion, employing 640 men, has resumed operations after having been closed for six months. Nearly every mine in Williamson County is now operating three-fourths or more of the time, with indications of continuing throughout the winter.

Loading Scale Still Distant.—There seems to be little hope at the present time of signing individual agreements between operators and locals in Illinois on the question of installation and operation of loading machines. Attempts to do so thus far have met with failure owing to the provisions demanded by the miners despite their apparently conciliatory attitude toward machines. It is hoped that when the market tapers off the miners will be more agreeable on the issues involved.

The Slogo mine, near Marion, is being put into shape for a resumption of operations early in December. The shaft, which is owned by the Slogo Coal Co. of St. Louis, has been idle since March, 1924.

Income Climbs.—The United Electric Coal Cos. reports for the quarter ended Oct. 31, 1926, net income of $169,122 after royalties, depletion, depreciation, interest, federal taxes, etc., equivalent, after allowing for dividend requirements on the 7 per cent preferred stock, to $1.29 a share on 120,000 no-par shares of common stock. This compares with $109,255, or 85c. a share, in the corresponding quarter of last year.

The Golden Rule mine, near East St. Louis, has resumed operations with a full force of 120 men. More than 1,000 miners have returned to work in the Belleville district.

More Openings Announced. — Mine No. 8, at Tovey, near Taylorville, has started work following a long shutdown. The South Wilmington Mine No. 3, Saunemin, also has been reopened.

INDIANA

More Reopenings Announced.—Bickett Shirkie mine No. 2, north of Terre Haute, one of the largest mines in that territory, is preparing to reopen after being closed for many months. A number of men already have been put to work cleaning out the mine and it is expected that coal will be hoisted in another week. Word also has been received that Keller mine No. 2, in the Clinton field, is another of the many mines now getting ready to resume operations. Only a few of the really large mines in the Terre Haute and Clinton fields now remain idle and it is thought all will be working before the end of the month.

Sergeant Mines Under Union Banner.—Sargeant mines Nos. 1 and 2, near Newburg, are working under the union wage scale after a controversy with union mine leaders that has lasted for more than a year. The agreement ending the controversy was signed Nov. 19.

To Resell Strip Properties?—A hearing is to be held Dec. 2 to determine if the Pigeon Creek strip mine properties, near Boonville, shall be resold. The date was set at a hearing at Boonville on Nov. 15. The Patoka Coal Co. was the highest bidder for the property at a sale held last summer, but bondholders of the Pigeon Creek company filed a bond guaranteeing that the property would bring more at a resale. The property consists of several hundred acres of coal lands and stripping equipment.

The old Littles mine, located at Littles, Pike County, and owned by the Neal Coal Co., has started working with a full force of men. The mine had been working only part time off and on for several weeks past. Indications are that the mine will be worked at full capacity all winter.

Cumberland Gap, Tenn., from Pinnacle Mountain

The railroad in the valley straight ahead is the Southern, leading to Knoxville. That turning to the left is the Louisville & Nashville, leading to Norton, Va.

KENTUCKY

First Shipment from King's Creek.—In the King's Creek section of Letcher County, the first shipments of coal were made recently by the Champion Coal Co., which is developing the King's Creek Coal cannel coal. New buildings are going up and it is proposed to have at least three hundred miners' houses, besides the store, office building, recreation and others.

The Coneva Coal Corporation is filling up its twenty-five new miners' houses at Coneva and will soon produce twenty cars of coal daily.

Firebug Destroys Tipple.—Fire believed to have been of incendiary origin at 3 a.m., Nov. 23, destroyed the large tipple of the White Star Coal Co., Pineville, causing a loss of about $80,000, with but $18,000 insurance. W. L. Hammond, president of the company, stated that the blaze, when discovered, was shooting from the top of the tipple, which soon became a mass of ruins. On the Sunday preceding this fire a blaze broke out in the power house, about two miles from the tipple, and it also was destroyed. A temporary power house was being installed, with plans for resuming shortly. Mr. Hammond stated that the plant would now be down for several months until a new tipple could be erected.

Activity Spreads.—J. S. Oldham, of Virginia, has leased and started the mines of the Mitchell-Willis Coal Co. at Gorman. The old Williams mines near Krypton have been overhauled and are now starting up with seven cars of coal daily. The Red Jacket Coal Co. at Dakota, is building twenty-five new miners' houses and is increasing capacity to a marked extent.

MISSOURI

Strike Settlement Near.—A peaceful settlement of the wage dispute of the coal diggers in the Fulton district who quit work because their employers refused to split 50-50 a 2c. per bushel advance in coal prices seems at hand. The strike started on Nov. 20. The operators raised the price of coal because of the passage on Nov. 2 of a workmens' compensation law for Missouri. On Nov. 23 about half of the men employed by the Simmons Coal Co. returned to work and the others are expected back within a few days. None of the men employed by the Trigg Crowson mine had returned to their posts, however. The Gohring mine and the Reed strip mine are working.

Reports Good Coal Deposit.—That a large deposit of high-grade coal exists a few miles west of Macon is the information given the Chamber of Commerce by H. Medlin, president of the Interstate Brotherhood of Miners. Since early summer Medlin and his associates have been working for a restoration of the coal business in Missouri in order that the state demand for fuel will be supplied by state mines. Tests made west of Macon show beds running 6 to 8 ft. thick divided practically in the center by strata of high-grade fireclay. One operating shaft will handle both products. The coal is reached at a depth of 100 ft. and is crossed by the main line of the Burlington railroad.

OHIO

The meeting of the board of directors of the Ohio Chamber of Commerce set for Nov. 26 has been postponed until Dec. 3. This meeting was primarily called for the purpose of receiving and acting upon the report of the special committee headed by Samuel S. Wyer which was appointed as a fact-finding body to probe the coal depression in Ohio. The report will not be given out until passed on by the board of directors of the Chamber.

The C. A. Mullen Coal Co.'s mine at Crooksville, which had been idle for more than a year, has resumed operations, giving employment to 75 men.

OKLAHOMA

W. P. Mullin and associates have filed suit against the McAlester-Adamson Coal Co. for $7,500 damages and for specific performance of contract. It is alleged that Mullin took over a mine on a lease ten years ago, with a definite contract that at the end of the lease period the McAllester company was to buy at a reasonable figure such machinery and equipment as Mullin had installed. Machinery and material installed during the time specified, according to the petition, cost $20,000 and is now worth $7,500, but the McAlester-Adamson Coal Co. refuses to carry out the contract to buy the equipment.

PENNSYLVANIA

Strike Is Short-Lived.—A strike of more than 1,400 workers at the No. 9 colliery of the Pennsylvania Coal Co., in Pittston, which began Nov. 24, ended two days later following a conference between the union district president, Rinaldo Cappellini, and A. K. Morris, vice-president and general manager of the coal company. The walkout was called by breaker hands who asserted that the company announced that an effort would be made to double the production on the day previous to Thanksgiving Day in order to offset the loss caused by the holiday idleness. The breaker workers refused to increase production.

The Springdale washery of the Lehigh Valley Coal Co., not far from Mahanoy City, has resumed operations after being idle for five months. The heavy demand for domestic sizes of hard coal is said to be responsible for the renewal of operations. Thirty men are employed at the plant.

To Sell Fayette Mine.—The coal lands and mining rights, surface lands and all the mining equipment, tools and plant of the Fayette Coal Corporation, at Noblestown, will be sold at receivers' sale in one lot on Dec. 13 in the rotunda of the City-County Building, Pittsburgh. The offer will include all remaining coal of the Pittsburgh seam on this property, miners' houses, store building, tipple equipped with scales and electrically driven shaker screens, blacksmith shop with tools and power hammer, power house and 200-kw. Gen-

eral Electric motor-generator set, siding connection with Pennsylvania R.R. and ample mine tracks, slate-dump equipment, over 300 mine cars, one 8-ton General Electric haulage locomotive, five cutting machines, mine telephone, etc. The property is connected with the power lines of the West Penn company. The mine is now producing about 250 tons of coal per day.

Out of Red.—The Pennsylvania Coal & Coke Co. and subsidiaries report October surplus of $35,511 after ordinary taxes, depreciation and depletion, but before federal taxes, against a surplus of $4,339 in October, 1925. Deficit for the first ten months of 1926 totaled $231,401 after above charges, comparing with a deficit of $453,194 in the same period of the preceding year.

The McClure mine, near Big Run, which was bought recently by August Sunbery of Punxsutawney, is already being enlarged and improved. It has been running for several years, employing 35 men and turning out 150 tons of coal a day. The connection is at Eleanora on the Buffalo, Rochester & Pittsburgh R.R.

To Redeem Bonds.—Lehigh & Wilkes-Barre Corporation, holding company for the Lehigh & Wilkes-Barre Coal Co., will redeem $3,000,000 of its $5,000,000 outstanding 5½ per cent, serial trust bonds, reducing its funded debt to $2,000,000, half of which will be due Jan. 1, 1923, and the other half Jan. 1, 1934. Series F bonds will be redeemed at 101½, series G at 102 and series H at 102½. Interest ceases after Jan. 1, 1927.

UTAH

Water Pocket Stops Operation.—Through the tapping of a water pocket operations at the mine of the Sevier Valley Coal Co. have been held up. The water rushed in so suddenly and the flow was so great that the pumps proved inadequate to cope with the situation. The water is now under control, and it is hoped that production will be resumed in the near future. Additional equipment is being provided to meet such occurrences in the future.

VIRGINIA

Mushroom Mines Spring Up.—From twenty to thirty new mines, all smaller operations, have sprung into activity in Virginia in the past thirty days, as a result of the rapid price advances of several weeks ago. However, they have done little to increase production, but have merely distributed the number of miners over a greater number of operations.

Roaring Fork Breaks Silence.—The Blackwood Coal & Coke Co. has reopened its Roaring Fork mine, closed down a short time ago, and a Mr. Stoker has been placed in charge as superintendent.

WASHINGTON

Plan Mine Structure.—Construction of a modern building, 295x40 ft. to house the offices, warehouse, shops and power house at New Black Diamond mine, five miles east of Renton, has been announced by N. D. Moore, vice-president of the Pacific Coast Coal Co. Work on the structure is expected to be under way within a few days. With the completion of this work, about March 1, the New Black Diamond mine will be in full production. With a normal market the mine will provide employment for 300 men.

WEST VIRGINIA

Announcement has been made by R. M. Lambie, head of the Department of Mines, of the transfer of the headquarters of David K. Smith, mine safety director in charge of the Wheeling-Elkins district, from Elkins to Wheeling. The change was necessary, according to Mr. Lambie, because of the hazard existing in the Wheeling section. It is stated by Mr. Smith that the gas and roof conditions of the mines in the Wheeling district are much more hazardous than in the Elkins district. The department was also led to make the change in view of the fact that there are a larger number of mines in the vicinity of Wheeling than in the Elkins district.

A. Z. Litz, of Tazewell, Va., has purchased from Dr. J. L. Sameth, of Welch, 400 acres of coal land in McDowell County. The deal was closed at Welch last week. The purchase price was not made public. The land is underlaid with the No. 3 and No. 4 Pocahontas seams.

Tug River Record Broken.—Coal production in the Tug River field in the week ending Nov. 13 was the highest in the history of the field. This was 187,992 tons, or over 12,000 tons more than the preceding week, when the record for all time had been broken.

Not in the last five or six years have as many new coal companies been organized in West Virginia as were launched in October, high prices prevailing at that time having offered an incentive apparently to the formation of 22 new companies with an aggregate or combined capital of $645,000 aside from the companies organized with shares of no par value.

CANADA

Urges Higher Duty on Coal. — The Advisory Tariff Board will hold a public sitting Jan. 18, 1927, in connection with an application filed by the British Empire Steel Corporation covering tariff rates on coal and coke. The company seeks the imposition of a duty on anthracite screenings imported for steam purposes, on coke imported for metallurgical foundry and domestic uses; abolition of the rebate now granted in the case of coal imported by operators of byproduct coke ovens, and an increase of the duty on bituminous coal.

Near the Office at Pruden, Tenn.

The Pruden Coal & Coke Co., which owns this property, operates three mines within a radius of two miles of Pruden. Through the treetops at the upper left can be seen the headhouse of the No. 1 mine, the oldest operation.

With earnings of the Dominion Coal Co. climbing to the highest level for some years, interests close to the company believe that it will not be long before the directors will consider the resumption of dividends on the preferred stock.

Explosion Kills Ten.—An explosion which occurred on the morning of Nov. 23 on the fourth level of the McGillivray Creek Coal & Coke Co.'s mine at Coleman, Alta., in the Crow's Nest Pass region, caused by the accumulation of dust and gas resulted in the death of ten miners. Twenty-eight men were in the mine at the time, eighteen of whom escaped. Rescue parties recovered the body of one of the victims, but further progress was halted by a series of explosions and an outbreak of fire. In order to extinguish the fire the level was flooded and officials state that it probably will be a week before the other bodies can be recovered and the extent of the damage ascertained. The Provincial Government of Alberta will appoint a commission to investigate the cause of the explosion, and at the hearing suggestions will be received whereby the Mines Act might be improved.

Among the Coal Men

Horace F. Baker has been elected chairman of the board, president and director of the Pittsburgh Terminal Coal Corporation, Pittsburgh, Pa., to succeed C. E. Tuttle. Mr. Baker has been attorney for the company since 1909.

Raymond F. Baer, formerly president of the Shawnee Fuel Co., has become associated with the Seiler Coal Co., 90 West St., New York City, as manager of its bituminous department.

N. V. Hansell, who has been chief engineer of the Deepwater Coal & Iron Corporation for some time, has been made general manager of all the company's operations, which includes coal mines at Nauvoo, West Nauvoo and Arkadelphia, in Walker County, Alabama. The headquarters of the corporation are Jasper, Ala.

B. F. Nigh, secretary of the Michigan-Ohio-Indiana Coal Association, with headquarters in Columbus, Ohio, has accepted an invitation to make an address on railroad freight matters before the Cleveland Retail Coal Dealers' Board on Dec. 15. The occasion is the annual dinner of the board. Mr. Nigh, who is at the head of the collection bureau of the association, is recognized as an expert on railroad freight questions as they effect the coal trade.

Al E. Thurnes has been appointed assistant to the general manager, department of allied relations, Consolidation Coal Co., under Brooks Fleming, Jr., and will have offices with Mr. Fleming in the Watson Building, Fairmont, W. Va.

Ralph W. Ealand, of Bristol, Va.-Tenn., who had been general manager of the Hagan coal mines, near Dungannon, Va., since the mines were opened last August, has resigned, owing to ill health, which made it impossible for him to give his full time to the operation. He was succeeded by **Thomas F. Dison,** of Norton, Va., who arrived in Dungannon recently to take charge of the operation. These mines, which were formerly operated by the J. S. T. Coal Corporation, of Dante, Va., are owned by the Hagan Trustee Syndicate, of Bristol, of which Charles F. Hagan is manager.

C. L. Amos, of Syracuse, N. Y., has been appointed a director of the American Wholesale Coal Association, according to an announcement by G. H. Merryweather, president of the association.

U. S. Senator Fred M. Sackett, of the Byrne & Speed Coal Co. interests, Louisville, Ky., left for Washington recently, to spend the winter, after a hectic few weeks in Kentucky during the fall campaign.

R. S. Debo has been made mine manager at the Martinsburg coal mine, Martinsburg, Mo., succeeding Daniel Richmond. Mr. Debo has already assumed his new duties.

Ira C. Cochran, commissioner of the American Wholesale Coal Association, speaking at a recent joint meeting of the association with the Chicago Wholesale Coal Shippers' Association at Chicago, said it will be many months before the world shortage of coal is relieved despite the virtual collapse of the British miners' strike. Determined

Ira C. Cochran

effort to pass regulatory coal legislation at the coming session of Congress was predicted by the commissioner. Whether the passage of such legislation can be prevented is a question in Washington, the headquarters of the commissioner, Mr. Cochran said.

Obituary

Lawshie Baird, one of the leading coal operators and business men of the Centre-Clearfield district of central Pennsylvania, died at his home in Philipsburg, Pa., on Nov. 20. He was a heavy stockholder of the Moshannon Coal Mining Co. and prominently identified with a half dozen business concerns in his home town and was prominent in social and fraternal circles. He was born at Osceola Mills, Oct. 4, 1865. He is survived by the wife and two sons.

C. C. Boone, of Hazleton, Pa., representative for the Hendrick Manufacturing Co., Carbondale, Pa., died at his home on Nov. 10. Mr. Boone had been in the employ of the Hendrick company for thirty-five years and was well known in the anthracite region.

Earl Corbin, age 40, formerly mine manager of the Kathleen Mine of the Union Colliery Co., at Dowell, Ill., was instantly killed while at work recently in Old Ben Mine No. 9, at West Frankfort, Ill. He was assisting in placing timbers in some of the underground workings of the mine at the time of the accident. He had held several supervisory jobs with the Old Ben company at its various mines and was well known throughout the entire southern Illinois field.

W. G. Hartshorn, 66 years old, wealthy coal operator of Elkville and Danville, Ill., died at his home in Elkville, on Nov. 18. He had been ill a week. For twenty-five years he operated coal mines in Ohio, Indiana and Illinois and at the time of his death was owner of the Black Servant mine, at Elkville.

Byproduct Coke Output Near Record in October; Beehive Production Low

Production of byproduct coke in the United States increased from 3,641,000 net tons in September to 3,812,000 tons in October, a gain of 171,000 tons, or 4.7 per cent. With the exception of January, 1926, October output is the highest on record. The daily rate for the 31 days in October was 122,975 tons, an increase of 1,596 tons per day, or 1.3 per cent, when compared with the September rate. There were 76 active plants in October, and these plants produced about 91 per cent of their capacity.

Beehive coke output for October shows a decided drop, the estimated total being 867,000 tons for the month, compared with 1,310,000 tons made in September. The decrease is 443,000 tons, or nearly 34 per cent.

The total amount of byproduct and beehive coke made in October was 4,679,000 tons, byproduct plants contributing 81 per cent and beehive plants 19 per cent. This compares with a total output of 4,951,000 tons in the preceding month.

Output of Byproduct and Beehive Coke in the United States*

(In thousands of net tons)

	Byproduct	Beehive	Total
1923 monthly average..	3,133	1,615	4,748
1924 monthly average..	2,833	806	3,639
1925 monthly average..	3,326	946	4,272
July, 1926.....	3,756	963	4,719
August, 1926.....	3,749	752	4,501
September, 1926.....	3,641	1,310	4,951
October, 1926.....	3,812	867	4,679

* Excludes screenings and breeze.

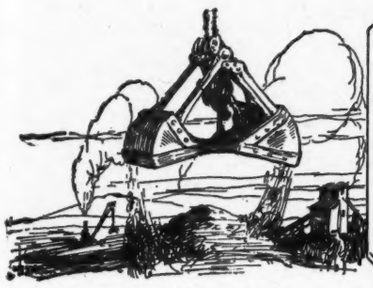
The total amount of coal consumed at coke plants during October was 6,844,000 tons, of which 5,477,000 tons were consumed in byproduct ovens, and 1,367,000 tons in beehive ovens.

Estimated Monthly Consumption of Coal in Manufacture of Coke

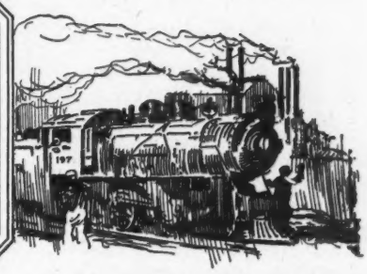
(In thousands of net tons)

	Consumed in Byproduct Ovens	Consumed in Beehive Ovens	Total Coal Consumed
1923 monthly average	4,523	2,507	7,030
1924 monthly average	4,060	1,272	5,332
1925 monthly average	4,759	1,452	6,211
July, 1926.....	5,396	1,519	6,915
August, 1926.....	5,386	1,188	6,574
September, 1926.....	5,232	2,066	7,298
October, 1926.....	5,477	1,367	6,844

Of the total amount of byproduct coke made during October, 3,150,000 tons, or 82.6 per cent, was made in plants associated with iron furnaces, and 662,000 tons, or 17.4 per cent, was made at merchant or other plants.



Production And the Market



Price Reaction Moderates in Soft-Coal Markets; Production Continues at Top Speed

The violent reactions which have marked the course of the bituminous coal markets of the United States since the end of the British strike first appeared a certainty gave way last week to more moderate readjustments in spot quotations. Production, which the pessimists predicted would collapse at once, continues at top speed. The output of soft coal during the week ended Nov. 20 broke all records. Making due allowance for the Thanksgiving Day holiday, it seems likely that last week also will rank high from the standpoint of daily outturn.

West Virginia and Kentucky, which rode the top of the late rise, now are bearing the brunt of the buyers' attacks upon prices. High-volatile coals from the first-named state declined 25 to 75c. last week; spot quotations from eastern Kentucky broke to the same extent. Smokeless lump dropped 25 to 50c. The price movement in mine-run was more erratic; at Boston quotations slumped $1 to $1.25 per gross ton, but net ton quotations at Cincinnati gained 50c. over quotations for the preceding week.

Pennsylvania Defies Depression

Central Pennsylvania not only resisted further decreases in price levels but carried quotations 25 to 50c. above the ranges prevailing a week earlier in the field and at some of the tidewater markets. At New York, however, pools 9, 10 and 11 eased off. The fact that many consumers turned from West Virginia to Pennsylvania when prices were highest helps explain the relatively stronger position of the central Pennsylvania mines. Western Pennsylvania, on the other hand, was slightly weaker.

The favorable situation in central Pennsylvania, inconsequential changes which did not affect the basic stability of prices in Illinois and Indiana and the less violent breaks in West Virginia and Kentucky all served to check the rate of decline in spot levels for the country as a whole. *Coal Age* Index of spot bituminous prices on Nov. 29 was 239 and the corresponding weighted average price was $2.89. Compared with the figures on Nov. 22 this was a loss of 4 points and 5c. Since Nov. 8, however, the index number has receded 60 points and the weighted average price has declined 72c.

Production Again Breaks Record

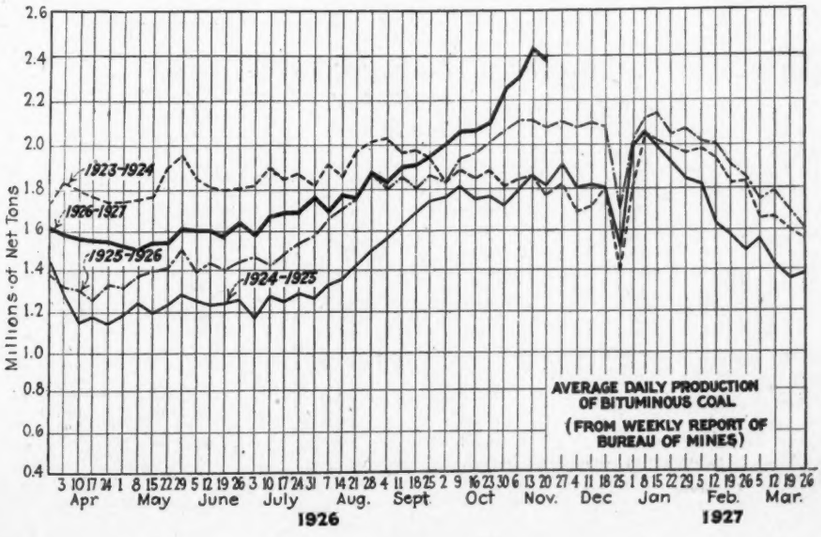
Production during the week ended Nov. 20 was estimated by the U. S. Bureau of Mines at 14,253,000 net tons. Loadings during the first two days of last week exceeded those of the preceding week by 5,278 cars. Cumulative output to Nov. 20 was 502,062,000 tons, as against 496,735,000 tons for the corresponding period in 1920 and 506,654,000 tons in 1923. Lake loadings the week ended Nov. 28 were 957,577 tons of cargo and 38,375 tons of vessel fuel, bringing the season's total to 29,010,424 tons.

Who is buying all this coal is a question commonly heard these days. For one thing, export movement has not ended even if the British strike is dead. For another thing, industrial demand is expanding, both because of the winter season and because of actual growth. Undoubtedly some coal is going into storage, placed there by consumers who are fearful of what may happen next April. Just how much is being purchased as strike insurance is an unknown quantity. But American prosperity is the chief factor in present output.

Anthracite Output Falling

Anthracite output continues to fall behind the weekly averages made earlier in the year. During the week ended Nov. 20 the output was estimated at 1,760,000 net tons. Compared with the average weekly production in October this was a loss of 322,000 tons, or more than 15 per cent. Part of this loss may be attributed to the flood conditions at some of the mines, but part must also be charged against less active buying.

The Connellsville coke market is in the doldrums. Production is sharply curtailed, and this, more than an increase in consumer interest, has prevented drastic declines in prices. Nothing is heard of contracting for 1927. Domestic demand for byproduct coke is lively in most parts of the country. The refusal of the Interstate Commerce Commission to suspend rates opening up Michigan markets to Alabama will increase competition between Southern and Middle Western ovens.



Estimates of Production

(Net Tons)

BITUMINOUS

	1925	1926
Nov. 6	12,171,000	13,104,000
Nov. 13 (a)	12,167,000	13,807,000
Nov. 20 (b)	12,596,000	14,253,000
Daily average	2,099,000	2,375,000
Cal. yr. to date (c)	454,186,000	502,062,000
Daily av. to date	1,658,000	1,832,000

ANTHRACITE

Nov. 6	28,000	1,565,000
Nov. 13 (a)	33,000	1,788,000
Nov. 20 (b)	46,000	1,760,000
Cal. yr. to date (c)	61,438,000	75,139,000

BEEHIVE COKE

Nov. 6	292,000	192,000
Nov. 13 (a)	295,000	202,000
Nov. 20 (b)	284,000	206,000
Cal. yr. to date	9,022,000	10,447,000

(a) Revised since last report. (b) Subject to revision. (c) Adjusted to equalize number of days in the two years.

Midwestern Market Holds

Although a slowing up in buying has been felt in the mining fields, the tone of the Chicago market on Illinois and Indiana coals continued strong last week, with the price list on standard grades firm. The flurry earlier last month revealed many bare spots in retail and industrial storage piles and ordering to build up reserves has been keeping up the market. Recurring waves of cold weather also have contributed to keener interest.

For the first time in several weeks Eastern shippers are really soliciting business in the Middle West. Prices on high-volatile block from West Virginia and Kentucky have softened to $4@$4.50; egg is easy at $3.50@$4. Smokeless mine-run has not weakened, but lump and egg are offered freely at $4.50. Demand for anthracite has been stimulated by the weather. Coke, too, is strong.

The situation with respect to unfilled orders in southern Illinois is mixed. Some operations have a heavy backlog; others are less happily placed and complain of cancellations. Lump and egg are less active and nut is slower. Steam sizes are moving freely. Railroads still are heavy consumers, but no new orders have been placed in the past few days. Car supply has materially improved, but labor is none too plentiful.

Steam Sizes Less Active

Both southern Illinois proper and the Duquoin-Jackson County sector are averaging four to six days a week, but steam sizes are less active in the last-named area than in Franklin, Saline and Williamson counties. Practically full time is the lot of the Mt. Olive district, which continues to enjoy an unusual demand in Michigan and a steady call from Chicago and the Missouri River cities.

The brief reign of prosperity in the Standard field appears to be over. Prices on mine-run and screenings have declined about 25c., but lump is up 15 to 25c. Some mines are carrying "no bills" of nut. Railroad buying, while active, is less strong than it was. Operators are inclined to blame a buyers' strike for the slump, but the real explanation seems to be the rapid increase in production from the Belleville field, which brought all but a few mines into operation.

Cold weather brought little increase in business to the St. Louis retail market. Country domestic trade is well maintained, with preference in buying shown the medium priced coals. There is still a substantial movement of steam tonnage through the St. Louis gateway. Local wagon trade is good. There are fewer new orders from territories not normally served by the Illinois mines.

Kentucky Slump Continues

Mild weather and the slump in tidewater and lake demand continue to leave their impress upon spot prices in

Current Quotations—Spot Prices, Bituminous Coal—Net Tons, F.O.B. Mines

Low-Volatile, Eastern	Market Quoted	Nov. 30 1925	Nov. 15 1926	Nov. 22 1926	Nov. 29 1926†
Smokeless lump	Columbus	$5.25	$5.60	$5.25	*$4.50@$5.25*
Smokeless mine run	Columbus	3.10	4.25	3.75	*3.00@ 3.50*
Smokeless screenings	Columbus	2.60	2.75	2.35	2.25@ 2.50
Smokeless lump	Chicago	5.00	5.50	5.50	*4.50@ 5.00*
Smokeless mine run	Chicago	2.50	3.75	3.75	3.50@ 4.00
Smokeless lump	Cincinnati	5.10	5.50	5.35	*5.00@ 5.25*
Smokeless mine run	Cincinnati	2.35	4.10	3.25	**3.50@ 4.00**
Smokeless screenings	Cincinnati	1.90	3.25	2.85	**3.00@ 3.50**
*Smokeless mine run	Boston	5.30	9.00	8.10	*6.50@ 7.50*
Clearfield mine run	Boston	1.95	3.10	2.50	**2.50@ 3.00**
Cambria mine run	Boston	2.25	3.50	2.85	**3.00@ 3.75**
Somerset mine run	Boston	2.10	3.25	2.60	**2.75@ 3.25**
Pool 1 (Navy Standard)	New York	2.95	4.10	4.00	3.75@ 4.25
Pool 1 (Navy Standard)	Philadelphia	2.95	4.35	3.50	3.40@ 3.65
Pool 1 (Navy Standard)	Baltimore	2.20	3.60	3.60	**3.50@ 4.00**
Pool 9 (Super. Low Vol.)	New York	2.30	3.75	3.25	*2.75@ 3.25*
Pool 9 (Super. Low Vol.)	Philadelphia	2.30	4.35	3.25	3.15@ 3.40
Pool 9 (Super. Low Vol.)	Baltimore	2.00	3.00	3.00	**3.00@ 3.25**
Pool 10 (H.Gr.Low Vol.)	New York	2.00	2.85	3.00	*2.50@ 2.75*
Pool 10 (H.Gr.Low Vol.)	Philadelphia	2.05	3.85	3.00	2.90@ 3.10
Pool 10 (H.Gr.Low Vol.)	Baltimore	1.90	2.60	2.60	2.50@ 2.75
Pool 11 (Low Vol.)	New York	1.75	2.75	2.65	*2.35@ 2.50*
Pool 11 (Low Vol.)	Philadelphia	1.90	3.60	2.75	2.70@ 2.85
Pool 11 (Low Vol.)	Baltimore	1.65	2.35	2.35	2.25@ 2.50
High-Volatile, Eastern					
Pool 54-64 (Gas and St.)	New York	1.55	2.60	2.45	*2.00@ 2.50*
Pool 54-64 (Gas and St.)	Philadelphia	1.60	3.35	2.40	*2.35@ 2.50*
Pool 54-64 (Gas and St.)	Baltimore	1.65	2.85	2.85	2.75@ 3.00
Pittsburgh sc'd gas	Pittsburgh	2.85	3.50	3.10	*2.90@ 3.10*
Pittsburgh gas mine run	Pittsburgh	2.35	3.10	2.60	*2.50@ 2.65*
Pittsburgh mine run (St.)	Pittsburgh	2.15	2.75	2.40	2.35@ 2.50
Pittsburgh slack (Gas)	Pittsburgh	1.45	2.20	2.00	**2.00@ 2.10**
Kanawha lump	Columbus	2.85	5.10	4.35	*3.75@ 4.00*
Kanawha mine run	Columbus	1.70	3.85	3.00	*2.25@ 2.75*
Kanawha screenings	Columbus	1.20	2.10	2.10	*1.75@ 2.00*
W. Va. lump	Cincinnati	3.10	5.25	4.75	*4.00@ 4.25*
W. Va. gas mine run	Cincinnati	1.65	3.25	2.75	*2.50@ 2.75*
W. Va. steam mine run	Cincinnati	1.55	3.25	2.75	*2.50@ 2.75*
W. Va. screenings	Cincinnati	1.25	3.10	2.10	2.00@ 2.25
Hocking lump	Columbus	2.85	5.00	4.25	*3.25@ 3.50*
Hocking mine run	Columbus	1.65	2.75	2.25	2.00@ 2.50
Hocking screenings	Columbus	1.25	2.10	1.85	1.75@ 2.00
Pitts. No. 8 lump	Cleveland	2.50	3.35	3.10	2.50@ 3.75
Pitts. No. 8 mine run	Cleveland	1.85	2.85	2.30	**2.25@ 2.40**
Pitts. No. 8 screenings	Cleveland	1.45	2.25	1.80	**1.85@ 1.95**

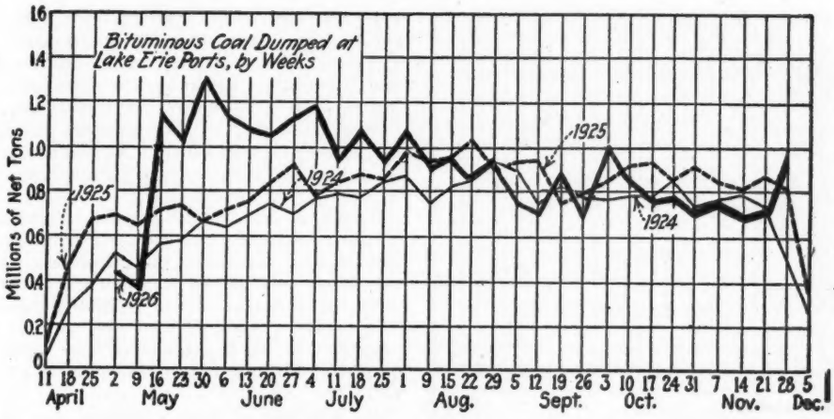
Midwest	Market Quoted	Nov. 30 1925	Nov. 15 1926	Nov. 22 1926	Nov. 29 1926†
Franklin, Ill. lump	Chicago	$3.50	$4.00	$4.00	$4.00
Franklin, Ill. mine run	Chicago	2.35	2.85	2.85	2.75@ 3.00
Franklin, Ill. screenings	Chicago	1.60	1.85	1.85	1.75@ 2.00
Central, Ill. lump	Chicago	3.00	3.50	3.50	3.25@ 3.75
Central, Ill. mine run	Chicago	2.30	2.60	2.60	2.50@ 2.75
Central, Ill. screenings	Chicago	1.40	1.70	1.50	**1.50@ 1.75**
Ind. 4th Vein lump	Chicago	3.10	4.00	4.00	4.00
Ind. 4th Vein mine run	Chicago	2.35	2.60	2.60	2.50@ 2.75
Ind. 4th Vein screenings	Chicago	1.60	1.85	1.85	1.75@ 2.00
Ind. 5th Vein lump	Chicago	2.35	3.50	3.50	3.25@ 3.75
Ind. 5th Vein mine run	Chicago	1.95	2.35	2.35	2.25@ 2.50
Ind. 5th Vein screenings	Chicago	1.40	1.60	1.45	**1.50@ 1.75**
Mt. Olive lump	St. Louis	2.85	3.10	3.10	3.00@ 3.25
Mt. Olive mine run	St. Louis	2.00	2.75	2.75	*2.50@ 2.75*
Mt. Olive screenings	St. Louis	1.75	1.60	1.60	1.50@ 1.75
Standard lump	St. Louis	2.40	2.65	2.65	**2.75@ 3.00**
Standard mine run	St. Louis	1.80	2.10	2.10	*1.75@ 2.00*
Standard screenings	St. Louis	.85	1.35	1.35	*1.15@ 1.35*
West Ky. block	Louisville	2.10	3.85	3.60	*3.25@ 3.75*
West Ky. mine run	Louisville	1.35	2.00	1.60	1.25@ 2.00
West Ky. screenings	Louisville	.80	1.70	1.30	1.10@ 1.50
West Ky. block	Chicago	2.35	3.60	3.60	*3.50*
West Ky. mine run	Chicago	1.25	2.25	2.25	*1.75@ 2.00*
South and Southwest					
Big Seam lump	Birmingham	2.35	3.00	2.85	2.75@ 3.00
Big Seam mine run	Birmingham	2.00	2.10	2.10	2.00@ 2.25
Big Seam (washed)	Birmingham	2.10	2.35	2.35	2.25@ 2.50
S. E Ky. block	Chicago	3.60	5.50	4.60	*4.00@ 4.25*
S. E. Ky. mine run	Chicago	2.15	3.25	2.85	*2.50@ 2.75*
S. E. Ky. block	Louisville	3.50	5.35	4.75	*4.00@ 4.75*
S. E. Ky. mine run	Louisville	1.60	4.10	2.55	*2.10@ 2.75*
S. E. Ky. screenings	Louisville	1.40	3.50	2.35	*2.00@ 2.25*
S. E. Ky. block	Cincinnati	3.10	5.10	4.75	*4.00@ 4.25*
S. E. Ky. mine run	Cincinnati	1.60	3.25	2.75	*2.25@ 2.50*
S. E. Ky. screenings	Cincinnati	1.25	3.00	2.10	2.00@ 2.25
Kansas lump	Kansas City	5.00	4.60	4.60	4.50@ 4.75
Kansas mine run	Kansas City	3.10	3.00	3.00	3.00
Kansas screenings	Kansas City	2.30	2.35	2.35	2.35

* Gross tons, f.o.b. vessel, Hampton Roads
† Advances over previous week shown in **heavy type**; declines in *italics*

Current Quotations—Spot Prices, Anthracite—Gross Tons, F.O.B. Mines

	Market Quoted	Freight Rates	November 30, 1925 — Independent	November 30, 1925 — Company	November 22, 1926 — Independent	November 22, 1926 — Company	November 29, 1926† — Independent	November 29, 1926† — Company
Broken	New York	$2.34	.....	$8.20@$8.95	.....	$8.50@$9.25	.....	$8.50@$9.25
Broken	Philadelphia	2.39	‡	‡	$9.25	8.50@ 9.15	$9.25	8.50@ 9.15
Egg	New York	2.34	‡	8.65@ 8.90	8.75@ 9.25	8.75@ 9.25	8.75@ 9.25	8.75@ 9.25
Egg	Philadelphia	2.39	‡	‡	9.00@ 9.50	9.00@ 9.15	9.00@ 9.50	9.00@ 9.15
Egg	Chicago*	5.06	$9.50@10.00	8.03@ 8.25	8.26	8.13	8.26	8.13
Stove	New York	2.34	‡	9.15@ 9.40	9.60@10.00	9.25@ 9.50	9.60@10.00	9.25@ 9.50
Stove	Philadelphia	2.39	‡	‡	9.75@10.20	9.35@ 9.50	9.75@10.20	9.35@ 9.50
Stove	Chicago*	5.06	10.00@11.00	8.48@ 8.80	8.71	8.58	8.71	8.58
Chestnut	New York	2.34	‡	8.65@ 8.95	9.50@10.00	8.75@ 9.15	*9.50@ 9.75*	8.75@ 9.15
Chestnut	Philadelphia	2.39	‡	‡	9.25@10.00	9.00@ 9.15	9.25@10.00	9.00@ 9.15
Chestnut	Chicago*	5.06	10.00@11.00	8.50@ 8.75	8.48	8.53	8.48	8.53
Pea	New York	2.22	‡	5.00@ 6.25	6.00@ 6.50	6.00@ 6.50	6.00@ 6.50	6.00@ 6.50
Pea	Philadelphia	2.14	‡	‡	6.30@ 6.75	6.00@ 6.50	6.30@ 6.75	6.00@ 6.50
Pea	Chicago*	4.79	5.50@ 6.00	5.50@ 6.00	6.03	6.10	6.03	6.10
Buckwheat No. 1	New York	2.22	‡	2.50@ 2.75	2.25@ 2.60	2.50@ 3.50	2.25@ 2.60	2.50@ 3.50
Buckwheat No. 1	Philadelphia	2.14	‡	2.50@ 3.00	2.40@ 2.75	2.50@ 3.00	2.40@ 2.75	2.50@ 3.00
Rice	New York	2.22	‡	2.25	1.60@ 2.00	2.00@ 2.25	*1.50@ 1.85*	2.00@ 2.25
Rice	Philadelphia	2.14	‡	‡	1.90@ 2.00	1.75@ 2.25	1.90@ 2.00	1.75@ 2.25
Barley	New York	2.22	‡	2.25	1.10@ 1.50	1.50@ 1.75	1.10@ 1.50	1.50@ 1.75
Barley	Philadelphia	2.14	‡	‡	1.75	1.50@ 1.75	1.75	1.50@ 1.75
Birdeye	New York	2.22	‡	‡	1.25@ 1.60	2.00	1.25@ 1.60	2.00

*Net tons, f.o.b mines. †Advances over previous week shown in **heavy type**; declines in *italics*.
‡Quotations withdrawn because of strike which started Sept. 1, 1925.



the Kentucky field. All-rail buyers in the Middle Western and Southern states have not been slow to sense the situation and are curtailing buying to the minimum to force further reductions. Cancellations and rejections also add to the price unsettlement.

High-grade eastern Kentucky block now is available at $4@$4.50; lump, egg and nut, $3.25@$3.75; mine-run, $2.10@$2.75; slack, $2@$2.25. Western Kentucky block, lump and egg may be had at $3.25@$3.75; nut, $2.35@$2.75; mine-run, $1.25@$2; screenings, $1.10@$1.50. Despite these reductions, the general movement of coal is substantial.

Unlike communities closer to the sources of supply, there has been no softening in demand or prices at the Head of the Lakes. There is little canvassing for new business and dock men are reluctant to accept further orders for certain classes of tonnage, particularly smokeless. Some docks have increased their price on prepared Pocahontas to $9.25.

Active Market in Anthracite

Hard coal has regained its old-time popularity. The scarcity of substitute fuels, such as Pocahontas, has forced many consumers to renew their allegiance to anthracite. Some of the retail yards operated by the docks are refusing to accept individual orders in excess of ten tons from householders. Industrial buying of bituminous has shown a marked improvement since mid-November, with the iron and steel interests leading in the placing of liberal orders.

The fuel situation at Milwaukee last week showed no important change from that of the preceding week. Wholesalers, however, were in a more cheerful frame of mind because of the easier prices quoted at the mines. An effort is being made to rush as much coal as possible from the Eastern mines before the close of navigation. At the Twin Cities the market is in a state of flux, with the final outcome still uncertain. For the time being, however, prices are firm and demand steady.

The end of November saw a slower demand for Southwestern coals, with softness most marked in the prepared sizes. Deep-shaft Kansas screenings held close to the $2.35 contract basis and strip-pit slack went for $2.25. All the fields report accumulations of "no bills" of the domestic sizes. In Arkansas alone there are nearly 300 unbilled loads. Some quiet shading of prices has been resorted to to stimulate movement, but general quotations are unchanged.

"No Bills" Pile Up in Colorado

Colorado was another state reporting an uncomfortable accumulation of "no bills" of lump, due to a sudden rise in the thermometer. This has compelled some operators to crush mine-run to take care of orders for industrial coal to the steel mills and sugar-beet factories. Kemmerer-Rock Springs nut has dropped to $3.50 and slack has stiffened to $1.75@$2.

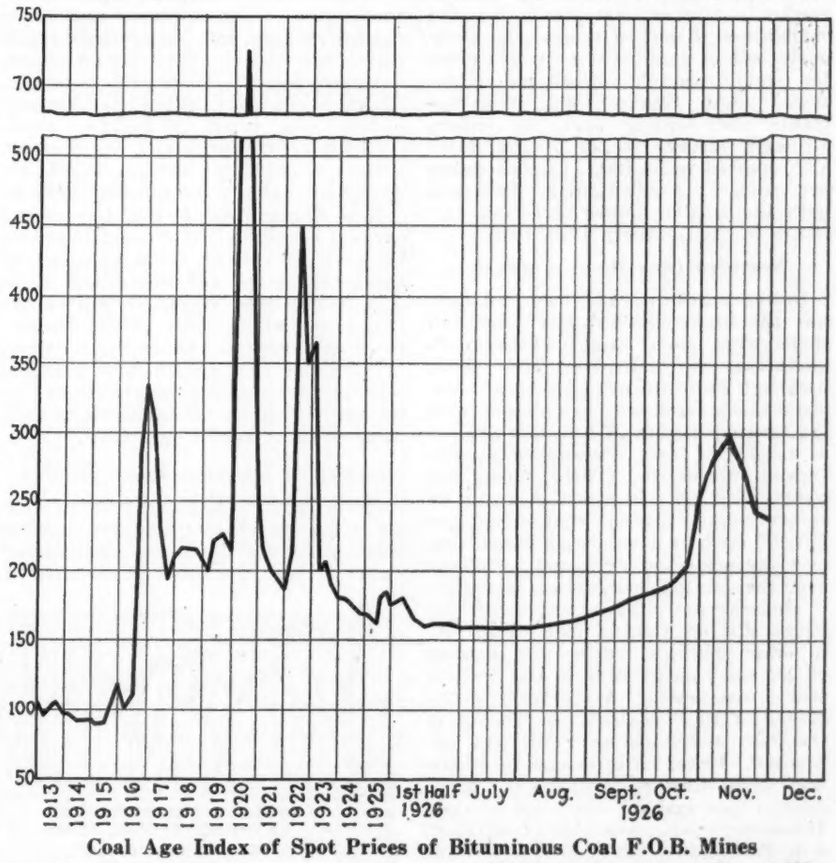
Utah operators report a surplus of slack, but so far they have been able to move it to market. The state as a whole is averaging about three days a week. Weather conditions have been against any gain in domestic buying and industrial demand has been easy. Prices, however, have been firmly maintained.

Consumers caught in the recent price jam are trying to take advantage of changed conditions to depress prices in the Cincinnati market. To a large extent they have succeeded because production has been high and congestion has thrown some distress tonnage on the market. Steam sizes of high-volatile coals are bearing the brunt of the attack. The general level of spot quotations has sunk 75c. to $1. Low volatile mine-run and slack are stronger.

Smokeless Prices Uncertain

Late last week smokeless producers still were uncertain as to the basis to be established for December deliveries. Some wanted $4 on mine-run, while others felt that $3.50 was about as much as the traffic would bear. Spot lump and egg were easy at $5@$5.25, a decline of 50c. in the top figure.

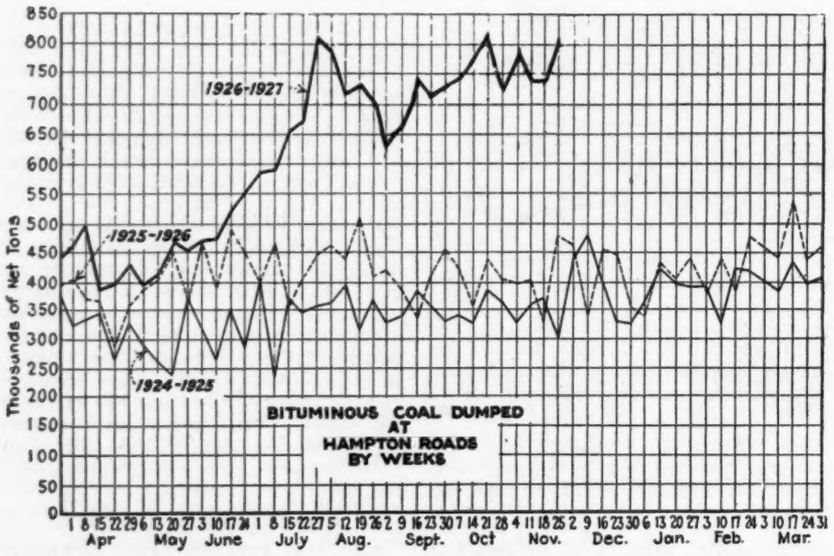
There was a decrease of 245 cars in the number of loads interchanged through the Cincinnati gateway last week. The total interchange was 13,-



Coal Age Index of Spot Prices of Bituminous Coal F.O.B. Mines

	1926				1925	1924
	Nov. 29	Nov. 22	Nov. 15	Nov. 8	Nov. 30	Dec. 1
Index	239	243	275	299	187	171
Weighted average price	$2.89	$2.94	$3.32	$3.61	$2.26	$2.07

This diagram shows the relative, not the actual, price on fourteen coals, representative of nearly 90 per cent of the bituminous output of the United States, weighted first with respect to the proportions each of slack, prepared and run-of-mine normally shipped, and second, with respect to the tonnage of each normally produced. The average thus obtained was compared with the average for the twelve months ended June, 1914, as 100, after the manner adopted in the report on "Prices of Coal and Coke: 1913-1918," published by the Geological Survey and the War Industries Board.


1926-1927
1925-1926
1924-1925
Thousands of Net Tons
BITUMINOUS COAL DUMPED AT HAMPTON ROADS BY WEEKS
Apr May June July Aug. Sept. Oct Nov. Dec. Jan. Feb. Mar.

904 cars. Included in this total were 1,568 cars en route to the lakes. The movement of empties to the mines was considerably larger last week, when the total reached 14,202 cars. Empty coalers to the Louisville & Nashville increased 227 cars; to the Chesapeake & Ohio, 1,025 cars. There was a decrease of 94 in the empty car movement to the Southern Ry.

The downward trend in the Columbus market continued last week, but the momentum of decline slackened. Optimists believe that there is a good chance for stabilization at month-end quotations. Both retailers and industrial plants are holding back on orders, although reserve stocks of the latter are reported to be light. Retail prices are softer. Production is declining, with the smaller mines the chief sufferers in the southern Ohio field.

Northern Ohio Break Checked

In the northern Ohio field not only was the break checked last week but there were some slight advances in quotations on mine-run and slack. Although both steam and domestic demand seem light when compared with the fevered buying of a month ago, as a matter of fact demand is steady. Output in the No. 8 field during the week ended Nov. 20 was the largest in several years. The quantity mined was 357,000 tons, an increase of 56,000 tons over the preceding week and 1,000 tons over the corresponding week last year.

Moderate activity characterized Pittsburgh district trading last week. As in other markets, buyers are holding off as much as possible in the hope of still lower prices. Aside from an increase of 10c. on slack, the ending of the lake season leaves Pittsburgh untouched. Prices on three-quarter steam and mine-run are unchanged; three-quarter gas and mine-run are weaker. Domestic coals, too, have softened; 4-in. Panhandle lump is $3.50@$4; 3-in., $3.50@$3.75; 2-in., $3.25@$3.50.

Central Pennsylvania Prices Up

In sharp contrast to most of the Eastern fields, central Pennsylvania quotations on pool coals were up 25 to 50c. in pool 1, 9 and 71 grades. Stronger export demand, following the slump of the preceding week, was credited with raising the prices. Pool 1 was $3.75@$4; pool 71, $3.50@$3.75; pool 9, $3.25@$3.50; pool 10, $2.75@$3; pool 11, $2.60@$2.75; pool 18, $2.40@$2.50.

As for weeks past, buyers and sellers struggle for position in the Buffalo market. Some of the former have been disappointed in their expectations of a more precipitate drop in high-volatile quotations. Fairmont lump and mine-run are weaker, but Youghiogheny and Pittsburgh steam coals are stronger. Fairmont lump is $2.50@$3; mine-run, $2.25@$2.50; slack, $2@$2.25; Youghiogheny gas lump, $3.50@$4; slack, $2.75@$3; Pittsburgh and No. 8 steam lump, $3@$3.50; slack, $2@$2.25; Allegheny Valley mine-run, $2.15@$2.45.

New England steam coal buyers are bargain hunting. The descent in prices, however, is not as rapid as some of these consumers had hoped and there is a feeling that $6@$6.25 will be the range controlling most of the December spot business. There are no signs of an acute shortage in New England territory and buyers caught short are turning to central Pennsylvania to keep down West Virginia prices.

Outlook at Hampton Roads Brighter

From the New England point of view the situation at the Southern loading piers gradually is being straightened out. Export business is fluctuating, with slightly more inquiries for high-volatile coals than for Navy Standard. There is a fair supply of Pocahontas and New River available for spot loading and less is heard of demurrage. Prices fluctuate, but the general trend is slightly downward. Demand for all-rail coal from central Pennsylvania is steady.

Spottiness still distinguishes the New York bituminous market. Movement last week was slow, due probably to the belief that prices would work lower with the collapse of the British strike. The better grades of coal are not running to the spot market in any large quantity, although total receipts at the piers are slightly above normal. The daily average of cars standing at tide is about 3,000.

Philadelphia Seeks Level

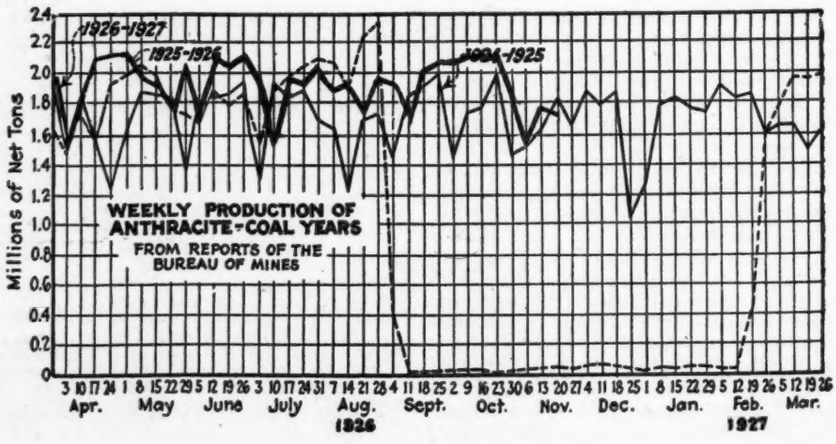
Philadelphia was busy last week trying to find itself. There were some rapid fluctuations in prices as the British situation unfolded, but at the end of the week quotations were about the same as they had been at the close of the preceding week. Export buying is more cautious, local buying for general industrial purposes more active. Railroads are finding it difficult to persuade producers to accept additional orders at such prices as the carriers offer. Tidewater and bunker trades have been strong.

Although the news from Great Britain cut short the upward swing to prices, export shipments remain the outstanding feature of the Baltimore market. Preliminary figures for November indicate that the month's clearances again will pass the 1,000,000-ton mark. Many vessels still are being chartered for Baltimore loading and a heavy movement is expected for several weeks.

Lull in Alabama Inquiry

Lull in export inquiry and bookings of coal for bunkering has relieved the pressure on the Alabama market, but domestic demand, both from territory normally supplied by the Birmingham district and from other sections of the country, absorbs all offerings. In some cases there have been slight recessions in top quotations on steam coals, but the general price level is unchanged. The coke market is steady.

Movement of hard coal at New York was slower last week. Retail dealers



Car Loadings and Supply

	Cars All Cars	Loaded Coal Cars
Week ended Nov. 20, 1926.....	1,078,812	242,013
Week ended Nov. 13, 1926.....	1,112,886	242,095
Week ended Nov. 21, 1925.....	1,057,674	189,182
Week ended Nov. 14, 1925.....	1,050,758	186,416

	Surplus Cars All Cars	Surplus Cars Coal Cars	Car Shortages All Cars	Car Shortages Coal Cars
Nov. 15, 1926.	98,704	11,321	.....	No report
Nov. 8, 1926.	88,130	12,539	.....	No report
Nov. 14, 1925.	112,572	37,041	.....	.....

are carrying full stocks and are depending for the most part on small orders. In some cases they are asking regular sources of supply to delay shipments. Independent quotations, however, have not been materially affected. Stove and nut continue their neck-and-neck race for leadership. The other sizes, both steam and domestic, are draggy.

Surplus Supply at Philadelphia

Notwithstanding restricted production, Philadelphia factors declare present offerings of anthracite slightly in excess of current active demand from local retailers. The reduced output has had a tonic effect upon steam sizes. Buckwheat is the least active of the juniors, but is moved without great difficulty. There are many shippers who could place more rice and barley if they had a surplus tonnage.

The anthracite trade at Baltimore is without marked developments. Supply seems ample for all current demands and no shortage is reported in any size. Lake shipments of hard coal from Buffalo during the week ended Nov. 25 were 60,400 net tons. Of this quantity 19,300 tons were cleared for Duluth and Superior, 15,600 tons for Milwaukee, 13,100 tons for Chicago and 12,400 tons for Fort William.

Connellsville Coke Dull

The last week in November was a dull one for the Connellsville coke market. Buying was light for all grades. Nothing is heard of forward contracts at this particular time. Offerings of free tonnage have not been pushed. As a result there has been little decline in prices. Blast-furnace coke was held at $4.25@$4.75; spot foundry, $5.50@$6, and heating coke, $3.50 and up.

Beehive coke production in the Connellsville and Lower Connellsville region during the week ended Nov. 20 was 140,000 tons, according to the Connellsville *Courier*. Furnace-oven output was 67,680 tons, a decrease of 620 tons when compared with the preceding week. Merchant-oven production was 72,320 tons, a decrease of 320 tons.

Big Gain in Exports

Bituminous exports from North Atlantic ports during the week ended Nov. 20 showed an increase of 220,952 gross tons over the shipments the preceding week, according to figures collected by the U. S. Department of Commerce. Exports by ports during the three weeks ended Nov. 20 were as follows:

Port	Week Ended Nov. 6 Gross Tons	Week Ended Nov. 13 Gross Tons	Week Ended Nov. 20 Gross Tons
New York.	23,146	3,500	14,2.5
Philadelphia	100,439	124,035	170,564
Baltimore...	267,974	177,335	329,183
Norfolk.....	226,014	315,998	315,740
Charleston..	15,600	11,968	24,046
Total.....	633,173	632,836	853,788

Anthracite Circular Prices for December at New York

(Per Gross Ton. f.o.b. Mines)

	Broken	Egg	Stove	Chestnut	Pea
Lehigh & Wilkes-Barre Coal Co...	$8.25	$8.75	$9.25	$8.75	$6.00
D., L. & W. Coal Co.....	8.25	8.75	9.25	8.75	6.50
Phila. & Reading Coal & Iron Co..	9.15	9.15	9.40	9.15	6.50
Lehigh Valley Coal Sales Co.....	8.50	9.00	9.35	9.00	6.50
Hudson Coal Co...	9.00	9.00	9.35	9.00	6.00
Lehigh Coal & Navigation Co.....	9.25	9.25	9.50	9.10	6.35
M. A. Hanna Co...	9.00	9.25	9.60	9.25	6.50

Buckwheat No. 1, $2.50 @ $3; rice, $2 @ $2.25; barley, $1.50 @ $1.75; birdseye, $2.

Production, Value, Men Employed, Days Worked and Output Per Man per Day at U. S. Coal Mines in 1925[1]

(Exclusive of product of wagon mines)

State	Net Tons: Loaded at Mines for Shipment	Net Tons: Sold to Local Trade and Used by Employees	Net Tons: Used at Mines for Steam and Heat	Net Tons: Made Into Coke at Mines	Net Tons: Total Quantity	Value: Total	Value: Average per Ton	Number of Employees: Underground: Miners, Loaders and Shotfirers	Underground: Haulage and Track	Underground: All Others	Surface	Total	Average Number of Days Worked	Average Tons per Man per Day
Alabama.....	19,056,904	550,491	298,833	98,167	20,004,395	$42,442,000	$2.12	15,596	3,251	3,792	4,458	27,097	246	3.00
Alaska.....	77,830	3,975	1,063	.....	82,868	405,000	4.89	55	10	26	66	157	243	2.17
Arkansas.....	1,176,888	20,460	22,691	.....	1,220,039	4,829,000	3.96	2,088	373	388	789	3,638	112	2.99
California, Idaho and Oregon..	[4]900	7,725	.....	.....	12,625	60,000	4.75	21	3	5	13	42	174	1.73
Colorado.....	9,454,769	528,098	218,303	109,381	10,310,551	30,322,000	2.94	8,472	1,453	1,269	2,009	13,203	192	[2]4.07
Georgia.....	55,532	579	1,412	8,651	66,174	220,000	3.32	37	11	19	70	137	220	2.20
Illinois.....	62,712,422	3,170,520	1,026,417	.....	66,909,359	146,492,000	2.19	53,242	8,534	8,568	7,479	77,823	161	5.33
Indiana.....	20,253,156	558,317	413,493	.....	21,224,966	42,884,000	2.02	14,412	2,928	2,031	3,361	22,732	159	5.89
Iowa.....	3,771,654	905,840	97,349	.....	4,714,843	14,807,000	3.14	7,302	933	1,102	830	10,167	153	3.02
Kansas.....	4,181,723	282,242	60,286	.....	4,524,251	13,013,000	2.88	5,462	558	592	1,188	7,800	169	3.44
Kentucky.....	53,721,081	793,337	428,063	126,189	55,068,670	94,825,000	1.72	33,216	7,361	7,462	8,985	57,024	206	4.68
Maryland.....	2,565,868	111,287	17,417	.....	2,694,572	5,312,000	1.97	2,406	455	266	453	3,580	209	3.61
Michigan.....	741,449	15,310	15,474	.....	808,233	3,391,000	4.20	1,028	280	132	139	1,579	186	2.75
Missouri.....	2,384,642	261,099	48,474	.....	2,694,215	8,282,000	3.07	2,994	300	607	1,213	5,114	166	3.18
Montana.....	2,858,174	131,570	53,942	.....	3,043,686	7,879,000	2.59	1,576	293	360	451	2,680	171	6.64
New Mexico...	2,338,094	45,389	51,635	121,733	2,556,851	8,611,000	3.37	2,248	416	332	458	3,444	202	3 68
North Carolina.	58,160	524	6,469	.....	65,153	283,000	4.34	65	28	19	28	140	272	1.71
North Dakota..	1,035,923	258,183	30,514	.....	1,324,620	2,445,000	1.85	718	74	76	439	1,307	153	6.61
Ohio.....	24,930,193	2,741,751	362,168	.....	28,034,112	54,057,000	1.93	27,544	3,347	3,935	4,832	39,658	151	4.67
Oklahoma.....	2,232,901	23,353	69,586	.....	2,325,840	7,667,000	3.30	3,078	853	677	1,023	5,631	153	2.70
Pennsylvania (bituminous).	114,456,238	7,584,846	1,517,142	13,369,793	136,928,019	287,899,000	2.10	103,698	14,697	19,067	19,336	156,798	200	4.36
South Dakota..	5,180	9,267	.....	.....	14,447	42,000	2.91	49	.....	.....	.....	49	143	2.06
Tennessee[3].....	5,040,944	113,934	98,170	200,963	5,454,011	10,077,000	1.85	5,171	1,059	825	1,259	8,314	211	3.11
Texas.....	982,129	7,910	18,336	.....	1,008,375	1,566,000	1.55	1,406	194	193	315	2,108	150	3.19
Utah.....	4,349,925	42,235	50,709	247,473	4,690,342	11,991,000	2.56	2,570	585	451	835	4,441	179	[2]5.90
Virginia.....	12,032,321	113,573	39,929	613,620	12,799,443	23,496,000	1.84	6,686	2,135	2,442	2,414	13,677	254	3.69
Washington....	2,316,191	114,623	56,593	50,483	2,537,890	9,176,000	3.62	2,059	379	537	751	3,726	193	3.52
West Virginia..	118,191,674	2,839,028	544,107	806,150	122,380,959	209,655,000	1.71	60,323	17,240	14,795	17,831	110,189	225	4.94
Wyoming.....	6,245,488	115,757	191,528	459	6,553,232	18,275,000	2.79	3,934	776	601	927	6,238	178	5.90
Total bituminous....	477,172,353	21,351,223	5,776,103	15,753,062	520,052,741	1,060,402,000	2.04	367,456	68,526	70,559	81,952	588,493	195	4.52
Pennsylvania anthracite....	53,768,372	2,884,577	5,164,200	.....	61,817,149	327,665,000	5.30	78,773	17,000	24,795	39,744	160,312	182	2.12
Grand total....	530,940,725	24,235,800	10,940,303	15,753,062	581,869,890	$1,388,067,000	$2.38	446,229	85,526	95,354	121,696	748,805	192	4.04

[1] Figures relate only to active mines of commercial size that produced coal in 1925. The number of such mines in the United States was 7,144 in 1925; 7,586 in 1924; and 9,331 in 1923.

Methods of mining in 1925: The tonnage undercut by hand was 81,138,026; shot off the solid, 53,091,496; cut by machines, 366,725,758; mined by stripping, 16,870,907; not specified, 2,226,554.

Size classes of commercial mines in 1925: There were 145 mines in Class 1A (500,000 tons and over), producing 20.9 per cent of the tonnage; 569 in Class 1B (200,000 to 500,000 tons), with 32.8 per cent; 833 in Class 2 (100,000 to 200,000 tons), with 22.7 per cent; 891 in Class 3 (50,000 to 100,000 tons), with 12.4 per cent; 1,969 in Class 4 (10,000 to 50,000 tons), with 9.4 per cent, and 2,737 in Class 5 (less than 10,000 tons), producing 1.8 per cent.

[2] Probably too high because of practice common in some districts of men going into mines to shoot coal and load mine cars on days when tipples or mines as a whole are not in operation.

[3] Figures published in weekly coal report No. 481 slightly revised.

Compiled by U. S. Bureau of Mines.

Foreign Market And Export News

British Orders Hold U. S. Exports At High Levels in October

The British situation again was the dominant factor in influencing the overseas movement of coal from the United States in October. Bituminous exports for the month were 4,188,365 gross tons, as compared with 3,736,969 tons in September, an increase of 451,396 tons. There was a sharp decrease in tonnage to the Irish Free State, but a still heavier increase in movement to the United Kingdom and North Ireland.

The distribution of the October shipments was as follows:

To	Anthracite, Gr. Tons	Bituminous, Gr. Tons	Coke, Gr. Tons
Austria	.....	.....	500
Azores and Madeira Islands	.....	3,081	.....
Denmark and Faroe Islands	.....	6,128	.....
France	.....	58,933	1,064
Germany	.....	.....	309
Gibraltar	.....	13,643	.....
Greece	.....	5,763	.....
Irish Free State	.....	84,948	.....
Italy	.....	147,436	.....
Malta, Gozo and Cypress Islands	.....	853	.....
Norway	.....	5,499	.....
Portugal	.....	24,114	.....
Spain	.....	.....	27
Turkey in Europe	.....	9,116	.....
United Kingdom and North Ireland	68	2,125,389	.....
Canada	449,982	1,251,742	80,977
British Honduras	.....	1	.....
Guatemala	.....	5	16
Honduras	10	85	20
Nicaragua	.....	400	2
Panama and Canal Zone	299	27,942	.....
Salvador	.....	6	9
Mexico	235	4,562	85
Miquelon and St. Pierre Islands	.....	1,821	.....
Newfoundland and Labrador	2,121	5,775	.....
Bermuda	.....	2,820	.....
Barbados	.....	3,608	.....
Jamaica	.....	3,024	.....
Trinidad and Tobago	.....	6,634	.....
Other British West Indies	25	3,686	.....
Cuba	6,425	31,116	1,301
Dominican Republic	.....	1,442	10
Dutch West Indies	.....	3,343	.....
French West Indies	.....	12,475	.....
Haitian Republic	.....	27	.....
Virgin Islands of the United States	.....	10,117	.....
Argentina	.....	82,723	.....
Brazil	.....	60,319	10
Colombia	.....	6,627	8
British Guiana	.....	1,466	.....
Dutch Guiana	.....	1,644	.....
Peru	.....	1,988	.....
Uruguay	.....	19,195	.....
Venezuela	5	150	.....
Philippine Islands	.....	.....	82
British West Africa	.....	3,037	3
Egypt	.....	59,451	.....
Algeria and Tunis	.....	20,864	.....
Other French Africa	.....	15,916	.....
Other Portuguese Africa	.....	13,906	.....
Poland and Dansig	.....	4,030	.....
Canary Islands	.....	41,515	.....
Total	459,170	4,188,365	84,423
October, 1925	43,835	1,245,540	70,603

To Study Better Utilization

An organization has been formed in Germany for the purpose of conducting research looking to wider outlets for an oversaturated coal production. The company, which is known as the Aktiengesellschaft für Kohlenverwertung (Company for Coal Utilization) is capitalized at 126,900 marks.

The problem of utilizating low-grade coals, not yet suitable for firing, in long-distance gas service, will be considered first, it is said, and later, long-distance heat service, better coal distribution yields, better dust firing and purchase of new inventions will be subjected to research.

Export Clearances, Week Ended Nov. 25

FROM HAMPTON ROADS

For United Kingdom:	Tons
Span. Str. Salazar	4,404
Br. Str. Cape Cross	5,446
Span. Str. Gorbea Mendi	5,750
Ital. Str. Ansaldo Savoia Primo	6,380
Ital. Str. Monte Maggiore	5,039
Br. Str. Persian Prince	6,905
Br. Str. Dayton	7,173
Br. Str. Quercus	4,295
Du. Str. Magdalena	4,216
Span. Str. Quernica	3,899
Du. Str. Clio	2,901
Br. Str. King Cadwallon	6,520
Ger. Str. Claus Richmers	6,827
Br. Str. St. Dunstan	7,209
Br. Str. Ainderby	7,660
Br. Str. Sutherland Grange	6,811
J.-S. Str. Izanbran	6,491
Span. Str. Ardnatzax Mendi	5,718
J.-S. Str. Zvir	7,765
Br. Str. Fantee	6,708
Br. Str. Anglo Egyptian	9,370
For England:	
Br. Str. Yorktown, for London	6,281
Br. Str. Aidan, for Liverpool	5,404
Br. Str. Athentic, for Tyne	6,165
Br. Str. Benmecadhin, for Mersey	7,631
Br. Str. Hughli, for London	5,666
Br. Str. Phidias, for London	6,713
For Gibraltar:	
Br. Str. Admiral Hamilton	4,275
Ital. Str. Emanuele Accame	11,585
Br. Str. Shrewsbury	4,625
For Morocco:	
J.-S. Str. Dubravka, for Casablanca	5,404
For Algeria:	
Ital. Str. Vulcan, for Oran	5,370
For Colombia:	
Br. Str. Arana, for Puerto Colombia	413
For Brazil.:	
Br. Str. Boverton, for Rio Janeiro	3,877
Br. Str. Parthia, for Rio Janeiro	5,088
Br. Str. Ocean Transport, for Rio Janeiro	6,273
Amer. Str. Centaurus, for Rio Janeiro	7,007
Br. Str. Jerseymoor, for Rio Janeiro	5,993
Br. Str. Nollsemen, for Rio Janeiro	6,368
For Egypt:	
Amer. Str. Orleans, for Port Said	8,725
For British West Indies:	
Amer. Schr. James E. Newsom, for Trinidad	983
Amer. Schr. Laura Annie Barnes, for Nassau	688
Dan. Str. Amalrenborg, for Bridgetown	4,199
For Jamaica:	
Amer. Schr. Helen Barnet Gring, for Kingston	1,815
Amer. Schr. Ella Pierce Thurlow, for Kingston	2,239
For Denmark:	
Swed. Str. Gustavsholm, for Copenhagen	3,874
For Bermuda:	
Amer. Schr. Frank A. Morey, for Hamilton	741
For Canary Islands:	
Br. Str. Newtonmoor, for Las Palmas	6,342
For Argentina:	
Br. Str. Kildare, for Rosario	5,576
Br. Str. Golden Sea, for Puerto La Plata	6,369
Br. Str. Derment River, for Buenos Aires	6,351
For Portugal:	
Br. Str. Wilston, for Lisbon	4,423
For Newfoundland:	
Nor. Str. Mathilda, for Cornerbrook	5,539

FROM BALTIMORE

For England (for Queenstown for orders unless otherwise specified):	
Am. Str. Monticello	9,146
Br. Str. Pilton, for Newcastle	4,517
Nor. Str. Sverre, for Sunderland	5,210
J.-S. Str. Izrada	5,522
Span. Str. Santi	4,334
Am. Str. Edgar Bowling	7,292
Span. Str. Urola	5,171
Span. Str. Arrantzazu Mendi	9,024
Ger. Str. Signal	4,475
Br. Str. Trident	6,393
Br. Str. Kamir	6,321
Br. Str. Achilles, for Liverpool	12,299
Grk. Str. Anna	7,887
Br. Str. Dalemoor	7,813
Br. Str. Adra	6,493
Br. Str. Molton, for Mumble Roads	4,599
Br. Str. Heathfield	7,213
Br. Str. Skegness	7,230
Br. Str. Rocie	5,839
Br. Str. Ethelwolfe	6,260
Fr. Str. Mecanicien Pricipale Carvin	5,909
Br. Str. General Lukin	4,259
Br. Str. Ethelaric	4,825
Br. Str. H. H. Asquith	7,434
For Italy:	
Ital. Str. Ugualglianza, for Genoa	5,855
Ital. Str. Giorgie Fassie, for Civitavecchia	5,537
Ital. Str. Emilia Pellegrina, for Genoa	5,753
Ital. Str. Serenitas, for Civitavecchia	7,005
For Egypt:	
Br. Str. Hounslou, for Alexandria	4,687
For France:	
Dan. Str. Brynhild, for St. Nazaire	2,987
Dut. Str. Ganymedes, for Rochefort	3,619
Fr. Str. P. L. M. 16, for Rouen	5,293
For Norway:	
Nor. Str. Kapland, for Bergen	1,944
For Canary Islands:	
Br. Str. Tulloohmoor, for Teneriffe	3,216
For Algeria:	
Ital. Str. Artico	8,794

FROM PHILADELPHIA

For United Kingdom:	
Ital. Str. Giovanno Florio, Br. Strs. Mervyn, Carrigan Head, Fernmoor, City of Florence and Hydaspes, Gr. Str. Diamentis, Port. Str. Infanta de Sagres, Dan. Str. Olaf Maersk	——
For Cuba:	
Dan. Str. Tannenberg, for Havana	——
Ger. Str. August Thyssen, for Havana	——
Nor. Str. Skogland	——
For Norway:	
Nor. Str. Valdemar Skogland, for Oslo	——
For Jamaica:	
Nor. Str. Marchioneal, for Kingston	——
For Portugal:	
Br. Str. Lady Cathleen, for Lisbon	——
For Canary Islands:	
Ital. Str. Lodovica, for Las Palmas	——
Nor. Str. Alaska, for Las Palmas	——
For France:	
Fr. Str. Syria, for Marseilles	——
For Uruguay:	
Br. Str. Newton Ash, for Montevideo	——
For Brazil:	
Br. Str. Bretwalda, for Rio Janeiro	——
Br. Str. Seatonia, for Rosario	——
For Argentina:	
J.-S. Str. Ingled, Belg. Str. Louvain and Br. Str. Navira for Buenos Aires	——
For Denmark:	
Gr. Str. Pallas, for Copenhagen	——

Hampton Roads Coal Dumpings*

(In Gross Tons)

	Nov. 18	Nov. 25
N. & W. Piers, Lamberts Pt.:		
Tons dumped for week	284,531	319,599
Virginian Piers, Sewalls Pt.:		
Tons dumped for week	153,017	192,714
C. & O. Piers, Newport News:		
Tons dumped for week	221,628	207,703

*Data on cars on hand, tonnage on hand and tonnage waiting withheld due to shippers' protest.

Pier and Bunker Prices, Gross Tons

PIERS

	—Nov. 18—	—Nov. 25†—
Pool 1, New York	$6.75@$7.25	*$6.50@$7.00*
Pool 9, New York	6.00@ 6.50	*5.75@ 6.25*
Pool 10, New York	5.75@ 6.25	*5.50@ 5.75*
Pool 11, New York	5.40@ 5.75	*5.25@ 5.50*
Pool 9, Philadelphia	6.70@ 6.90	6.70@ 6.90
Pool 10, Philadelphia	6.55@ 6.75	6.55@ 6.75
Pool 11, Philadelphia	6.15@ 6.35	6.15@ 6.35
Pool 1, Hamp. Roads	7.50@ 8.00	*6.50@ 6.75*
Pool 2, Hamp. Roads	7.00@ 7.25	*6.00*
Pool 3, Hamp. Roads	6.00@ 6.25	*5.30@ 5.45*
Pools 5-6-7, Hamp. Rds.	6.50@ 6.75	*6.00@ 6.25*

BUNKERS

Pool 1, New York	$7.00@$7.50	*$6.75@$7.25*
Pool 9, New York	6.75@ 6.75	*6.00@ 6.50*
Pool 10, New York	6.00@ 6.50	*5.75@ 6.00*
Pool 11, New York	5.65@ 6.00	*5.50@ 5.75*
Pool 9, Philadelphia	7.00@ 7.15	7.00@ 7.15
Pool 10, Philadelphia	6.80@ 7.00	6.80@ 7.00
Pool 11, Philadelphia	6.40@ 6.60	6.40@ 6.60
Pool 1, Hamp. Roads	7.50@ 8.00	*6.75*
Pool 2, Hamp. Roads	7.25	*6.25*
Pools 5-6-7, Hamp. Rds.	6.75	*6.25*

†Advances over previous week shown in **heavy type**; declines in *italics*.

Coming Meetings

American Society of Mechanical Engineers. Annual meeting, Engineering Societies Building, 29 W. 39th St., New York City, Dec. 6-9. Secretary, Calvin W. Rice, 29 W. 39th St., New York City.

Fifth National Exposition of Power and Mechanical Engineering, Dec. 6-11, at Grand Central Palace, New York City. Manager, Fred W. Payne, Grand Central Palace, New York City.

American Mining Congress. Annual meeting, Washington, D. C., Dec. 7-10, Hotel Mayflower. Secretary, J. F. Callbreath, Munsey Bldg., Washington, D. C.

Coal Mining Institute of America. Annual meeting, Chamber of Commerce, Pittsburgh, Pa., Dec. 8, 9 and 10. Secretary, H. D. Mason, Jr., Box 604, Ebensburg, Pa.

Coal Operators' Association of the Thick Vein Freeport Seam of Pennsylvania. Annual meeting Dec. 14, at Pittsburgh, Pa. Secretary, C. W. Gibbs, Pittsburgh, Pa.

American Society of Civil Engineers. Annual meeting, Jan. 19-21, 1927, at Engineering Societies Bldg., New York City. Secretary, George T. Seabury, 29 West 39th St., New York City.

Philadelphia Coal Club. Annual meeting, Jan. 27, 1927, at the Bellevue-Stratford Hotel, Philadelphia, Pa. Secretary, Charles K. Scull, Philadelphia, Pa.

American Institute of Electrical Engineers. Midwinter convention, Feb. 7-10, Engineering Societies Bldg., New York. Secretary, F. L. Hutchinson, 33 W. 39th St., New York City.

American Institute of Mining and Metallurgical Engineers. Annual meeting, Feb. 14-17, 1927, Engineering Societies Bldg., New York City. Secretary, H. Foster Bain, 29 West 39th St., New York City.

Monongahela Coal Association. Annual meeting, Jan. 13, at Morgantown, W. Va. Secretary, D. H. Pape, Morgantown, W. Va.

New Companies

The Missing Link Coal Co. was incorporated in Henryetta, Okla., early in November by John Wilson and Lon Swindell, both of Schulter, Okla.

The Bennett's Run Coal Co., of Bellaire, Ohio, has been incorporated with a capital of $10,000 to mine and sell coal from the Pittsburgh No. 8 field. The incorporators are W. T. Robertson, Earl Suchy, Frank Morton, Charles E. Clark and Elmer J. Kennedy.

The Carolina Coal Co. was incorporated in Florence, S. C., early in October, by S. B. Divine, H. W. Divine and others.

The Princess Coal Co., Fairmont, W. Va., with a capital of $20,000, has been incorporated by Harry C. Drum.

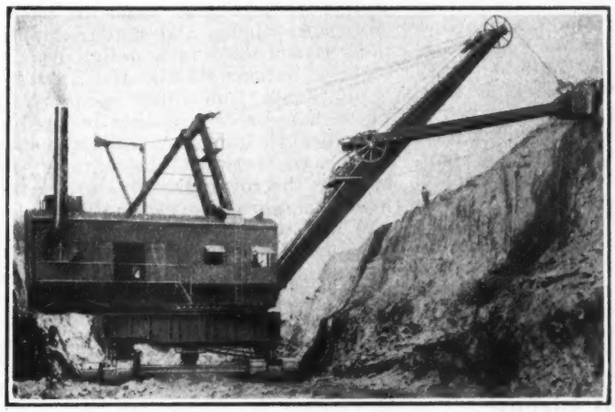
The Dean Branch Coal Co., Knoxville, Tenn., with a capital of $10,000, has been incorporated by J. T. Bradley and A. J. McCoy.

New Equipment

Convertible Stripping Shovel Developed

A new 6-yd. stripping shovel, readily and conveniently convertible into a dragline, has been just announced by the Bucyrus Co., Milwaukee, Wis. This new stripping shovel is called the 200-B and, like the 320-B, is equipped with box-girder boom and outside dipper handles. It is built for fast digging on jobs where a small revolving shovel has insufficient range and where an 8-yd. shovel is larger than is needed. Strip-mine operators who have investigated this machine believe that it will minimize operating cost.

The type of boom that the new machine uses is much lighter than a split-boom of equal strength, and it is especially adapted to withstand severe bending stresses and torsional loads. This construction is said to permit operation with less counterweight, which, in turn, is said to reduce the flywheel effect frequently encountered, so that the shovel can swing surprisingly fast.



This new 6-yd. shovel can readily be converted into a dragline

The change from a stripping shovel to a dragline can be made by a few minor adjustments in the main machinery and a change in the boom equipment. As a dragline, the shovel is constructed to be especially adapted for digging or stripping ore, coal, and phosphates.

The 200-B may be mounted either on four-wheel trucks or caterpillars, according to what the individual specifications demand. Both types of mountings have three-point support, which reduces the load and wear on the trucks when the loaded dipper swings over the corner of the base.

Automatic Signal System Speeds Haulage

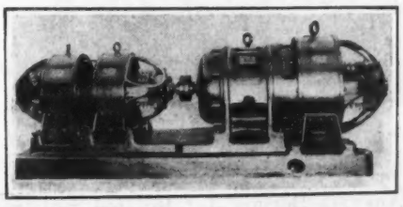
In attempting to provide a means of minimizing and possibly eliminating collisions in coal-mine haulageways, the American Mine Door Co., Canton, Ohio, has designed and developed the Canton Automatic Signal and Flagman. This haulage-control method does not require manual operation, and it is claimed provides a positive, safe and practical way of avoiding collisions. The operation of trips passing dangerous crossings, turn-outs, through partings and switches is safeguarded by lights controlled through the trolley wire.

It is claimed that when a trip approaches the block, which is a section of the haulway protected by the automatic flagging system, if no red light is shown it indicates that the block is clear and the trip may proceed. When a trip enters a block a green light indicates that it has the right of way, but at all other approaches to this block red lights indicate that it is occupied and the trip within it is thereby protected.

Control for Power Shovels Is Safe and Flexible

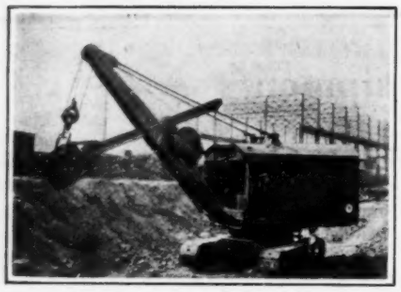
Variable-voltage equipment has been designed by the Westinghouse Electric & Manufacturing Co., E. Pittsburgh, Pa., for application to electric power shovels which it is claimed eliminates rheostatic losses, thus keeping power costs low. It also increases the speed of operation, and reduces operating expenses. This device is sturdy in construction and particularly designed for the electric power shovels used in coal and iron mines.

The motor-generator set used with this equipment consists of a driving motor and three d.-c. generators, one for each of the shovel motors. The accompanying photograph shows a typical motor-generator set used with this equipment. The d.-c.-type motors used with the variable-voltage equipment are



The Heart of a Power Shovel

A driving motor and three d.-c. generators, one for each of the shovel motors make up the motor-generator set.



Control Speeds Up Power Shovels

There is quick response of the motors to each movement of the control handles, giving, it is claimed, smooth and accurate control, which enables the operator to drive his machine at full speed continuously.

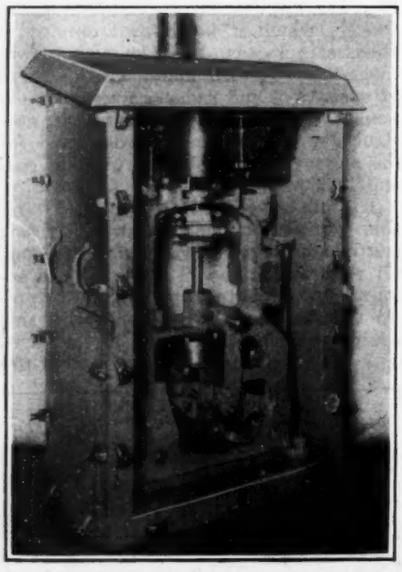
so constructed as to be able to withstand shock and strain and have a high overload capacity.

Controls for the variable-voltage system are simple, but strongly constructed. Three drum controllers, one each for the swing, thrust and hoist motions, govern the speed and direction of rotation of these machines. The controllers handle only the field current of the various generators. This current is relatively small, thus eliminating arcing and burning of the contacts. They have removable covers, making them readily accessible.

The machines respond quickly to each movement of the controller handles, and the smooth, accurate control of the swing, hoist, and thrust motions gives flexibility and enables the operator to drive his machine at full speed continuously. Protection from dust and grit to all parts of the motors, and safety in operation are other features that make this variable-voltage equipment advantageous on electric shovels.

Motor Closes Oil Circuit Breakers Without Battery

A recent addition has been made to the line of electric control devices made by the Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa.



Answers Demand for Isolated Stations

Where the maintenance of batteries for the operation of direct-current solenoid switches is not desirable this motor-operated switch can use 110 or 220 volts.

This is an oil circuit breaker operating mechanism known as the Type "CF-2" motor-operated device. It is designed for closing oil circuit breakers rated at 110 kv. and up, and is equipped with a universal motor for use on both direct and alternating current. The centrifugal principle is utilized whereby the outward movement of a pair of weights rotating at high speed, force the breaker to the closed position.

Development of this motor operated mechanism, the company states, has been made necessary by the extension of the use of oil circuit breakers in automatic substations, and at isolated locations where there is no battery.

New Push-Button Stations

A number of improved push-button stations, for use with various types of industrial magnetic control, have been introduced by the General Electric Co. These cover various fields of application, each being designed to meet some special set of circumstances. A standard dust- and water-tight push-button station of particular value in cement mills, coke plants, and similar applications is embodied in a design bearing the designations BS-8-E and BS-4-AA, "Stop," and "Run—Stop" respectively. These have silver contacts inclosed in a malleable iron box with a leather diaphragm between the buttons and holes in the cover, the pressure on the leather diaphragm operating the switch.

Where it is necessary to have contacts immersed in oil to minimize the danger of explosions or to prevent corrosion of the copper contacts, the "Stop" and "Start—Stop" stations bearing the designations BS-11-CL and BS-12-DK are recommended. These are specially designed to allow easy removal of the tank for filling with oil.

Recent Patents

Process of Making Fuel Briquettes; 1,600,065. Georg Plochmann, Teplitz-Schonau, Czechoslovakia. Sept. 14, 1926. Filed July 7, 1925; serial No. 42,047.

Coal Cutter; 1,600,245. Thomas E. Pray and George Bodin, Chicago, Ill., assignors to the Goodwin Mfg. Co., Chicago, Ill. Sept. 21, 1926. Filed May 1, 1920; serial No. 378,092. Renewed Feb. 10, 1926.

Dump for Mine Cars; 1,601,241. Lucien Duchscher, Calgary, Alta., Can., assignor to Riverside Iron Works, Ltd., Calgary, Can. Sept. 28, 1926. Filed Aug. 14, 1924; serial No. 732,115.

Skip Hoist; 1,601,698. Robert H. Beaumont, Radnor, Pa., and John H. Hampton, Oaklyn, N. J., assignors to R. H. Beaumont Co., Philadelphia, Pa. Sept. 28, 1926. Filed Nov. 19, 1925; serial No. 70,080.

Pneumatic Flotation Apparatus; 1,601,860. Oscar H. Johnson, Denver, Colo. Oct. 5, 1926. Filed Dec. 17, 1921; serial No. 523,166.

Conveyor Firing System for Pulverized Fuel; 1,595,151. A. J. Grindle, Chicago, Ill., assignor to the Grindle Fuel Equipment Co., Harvey, Ill. Aug. 10, 1926. Filed Oct. 25, 1924; serial No. 745,743.

Trade Literature

Wrought Steel Wheels and Other Circular Sections.—Forged Steel Axles. Carnegie Steel Co., Pittsburgh, Pa. Pp. 138; 5x7½ in.; illustrated. Contains data, tables and specifications pertaining to designs.

Principal Mine Supply Houses and Manufacturers' Sales Agents of the United States and Canada is the title of a booklet compiled by *Coal Age* containing list of firms specializing in selling and serving the anthracite and bituminous mines. The booklet has 18 pp. and the United States listings are classified by states. Copy may be had upon request.

Raymond Roller Mills. Raymond Brothers Impact Pulverizer Co., Chicago, Ill. Catalog No. 18; 8½x11 in.; illustrated. Included in this catalog is a detailed description of the new pneumatic feed control which is entirely automatic.

American Cable Co., Inc., New York City, has recently issued a 108-pp. book on the selection, use and care of wire rope for mine service. In addition to making special reference to recent developments in wire rope making, it gives constructive information on the various types of wire rope and their proper application, etc.

Publications Received

Investigations on the Treatment of Nova Scotia Oil Shales, by A. E. Flynn. National Research Council, Ottawa, Canada. Pp. 88; 6¼x9¾ in.; illustrated.

Ventilation of Mines, by Walter S. Weeks. McGraw-Hill Book Co., New York City. Pp. 228; 6x9 in.; illustrated. Price, $3. Presents such principles and experimental data as are necessary for the design of adequate systems of ventilation for mines, whatever their type.

The Mineral Industry, Vol. XXXLV, 1925, edited by G. A. Roush and Allison Butts. McGraw-Hill Book Co., New York City. Pp. 928; 6x9 in. Price, $12.

Handbook for Prospectors, by M. W. von Bernewitz. McGraw-Hill Book Co., New York City. Pp. 319; pocket size; illustrated. Price, $3. Gives sound practical information on equipment, methods of procedure and laws pertaining to mining.

Annual Report of the Director of the Bureau of Foreign and Domestic Commerce for the fiscal year ended June 30, 1926. Pp. 57; 6x9 in.

Proceedings Mine Inspectors' Institute of America. Pp. 110; 5¾x8¼ in.; illustrated. Covers the Pittsburgh (Pa.) meeting, May, 1926.

Statistical Abstract of the United States, 1925. Department of Commerce, Bureau of Foreign and Domestic Commerce, Washington, D. C. Price, $1. Pp. 846; 6x9 in.

A.S.T.M. Tentative Standards, 1926. American Society for Testing Materials, Philadelphia, Pa. Price, $7.50 in paper and $8.50 in cloth binding. Pp. 1,100; 6x9 in. Contains 227 tentative standards, including 2 on coal and coke, 6 on timber, 15 on preservative coatings.